RISK MANAGEMENT IN INDEPENDENT WATER AND POWER PLANT (IWPP) PROJECTS IN SAUDI ARABIA: A GROUNDED THEORY STUDY TO IMPROVE EFFECTIVENESS

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Abstract

The global demands for water and power services are rapidly increasing. In this context, Saudi Arabia (SA) has one of the highest water consumption rates per capita worldwide, and its energy requirements continue to grow. In terms of producing drinking water, SA ranks first, representing 22.4% of world capacity. However, that production is not unproblematic, and typically, the Water and Power Plant (WPP) projects following the Independent Water and Power Plant (IWPP) approach have involved a plethora of risks, as they rely on long-term arrangements to transfer project risks traditionally borne by government, to the private sector. Additionally, some risk factors apply generally to all construction projects, others are specific to WPP projects, and yet others apply only to IWPP projects. Unfortunately, three of four IWPP projects in SA have failed to meet their specified objectives; hence, there is an urgent need to implement effective risk management (RM) within these projects, as this represents an important success factor in their on-time delivery.

In this study, water and power practitioners in the Saudi public and private sectors, were interviewed as key informants, and related their experience. The Grounded Theory (GT) approach was adopted whereby three rounds of semi-structured interviews were performed to establish factors causing the poor implementation of RM in IWPP projects in SA. Whilst the research focused on IWPP projects, it also explored WPP projects (undertaken by government), due to the state's long experience of such activities. After analysis, the interview data was presented in propositional diagrams, fully grounded according to the practitioners' experiences. The findings indicate that all practitioners agree on the importance of RM in IWPP projects since these are complex undertakings that require effective RM for their success, but that currently, RM knowledge within this industry is lacking, and where RM is implemented, it is done so informally. Practitioners identified three clear factors that affect the behaviour of every single IWPP stakeholder in respect of risk, these being: the uniqueness of the Saudi Arabian culture, the high subsidies paid by the government to consumers and organisations, and the low attention paid to RM by top managements.

An emergent model is proposed expressing the complex reality of IWPP projects in SA, and illustrating three major phenomena, nine categories, and 26 sub-categories affecting RM implementation in these projects. This provides a strong foundation for further research aimed at securing the effective RM implementation in IWPP projects, and developing greater insight into the risk factors involved.

Keywords: IWPP project, risk management, Saudi industry, water and power plant.

Dedication

This thesis is dedicated to my beloved family members; in particular, to my Crown head, my mother then to the supportive person, my father. Also I dedicate the work to my brilliant wife as she provided me with endless support, and to my son, daughter, brothers, and sisters for their constant encouragement and love.

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Glossary of Abbreviations

BOD	Build-Operate-Deliver
BOOT	Build-Own-Operate-Transfer
BOT	Build-Operate-Transfer
BTO	Build-Transfer-Operate
EPC	Engineering, Procurement and Construction
FBOOT	Finance-Build-Own-Operate-Transfer
FDI	Foreign Direct Investment
G20	Group of Twenty (major economies - countries)
GDP	Gross Domestic Product
GT	Grounded Theory
IDA	International Desalination Association
IPP	Independent Power Plant
IWPP	Independent Water and Power Plant
KACARE	King Abdullah City for Atomic and Renewable Energy
KACST	King Abdulaziz City for Science and Technology
KSA	Kingdom of Saudi Arabia
MED	Multi Effect Distillation
MSF	Multi Stage Flash
NCB	National Commercial Bank
OSW	Office of Saline Water
PFI	Public Finance Initiative
PM	Project Manger
PMBOK	Project Management Book of Knowledge
PP	Power Plant
PPI	Private Participation in Infrastructure

PPP	Public Private Partnership
PSP	Private Sector Participation
RF	Risk Factor
RM	Risk Management
RMF	Risk Management Framework
RO	Reverse Osmosis
SA	Saudi Arabia
SEC	Saudi Electricity Company
SLEPT	Social, Legal, Economic, Political, and Technological
SPV	Special Purpose Vehicle
SR	Saudi Riyal (1 US Dollar =3.75 SR)
SWCC	Saline Water Conversion Corporation
SWPF	Saudi Water & Power Forum
UK	United Kingdom
UN	United Nations
USSABC	The US-Saudi Arabia Business Council
WB	World Bank
WEC	Water and Electricity Company
WP	Water Plant
WPP	Water and Power Plant
WRI	World Resources Institute

Publications

1. **Alsulaiman, Y**., Bowles, G. & Ogunlana, S. **(2015)** Devising an Organised Procedure for Effective Risk Management Independent Water and Power Plant (IWPP) Projects in Saudi Arabia. In: Journal of Civil Engineering and Architecture (JCEA), USA. (Formal reference # JCEA-E 20150313)- Accepted: it will be published in December issue.

2. **Alsulaiman, Y.**, Bowles, G. & Ogunlana, S. **(2015)** A Grounded Theory Investigation of Effective Risk Management Implementation in IWPP Projects in SA. In: *Proceedings 31st Annual ARCOM Conference, Lincoln, UK, 7-9 September 2015, UK,* Association of Researchers in Construction Management. (ID#3056)- Abstract accepted on 3-March-2015 and 1st draft paper was accepted.

3. **Alsulaiman, Y**., Bowles, G. & Ogunlana, S. **(2015)** Risk Management in Independent Water and Power Plant Projects in Saudi Arabia: Towards Effective Implementation. In: *Proceedings of Construction and Building Research Conference of the Royal Institution of Chartered Surveyors (COBRA). Sydney, 8-10 Jul 2015, Sydney, Australia*.

4. **Alsulaiman, Y**., Bowles, G. & Ogunlana, S. **(2015)** A Study of the Elements that Lead to Reach the Ineffectiveness of Risk Management Implementation in IWPP in Saudi Arabia. Paper In: 8*th Saudi Students' Conference, Imperial College London,* 31st Jan-1st Feb 2015, London, UK. (Note: Imperial College London asked me to submit the paper in different format based on their style to be published in the Proceedings.

5. **Alsulaiman, Y.**, Bowles, G. & Ogunlana, S. **(2014)** Evaluating Risk Management in Independent Water and Power Plant Projects in Saudi Arabia. In: *Proceedings 30th Annual ARCOM Conference*, 1-3 September 2014, Portsmouth, UK, Association of Researchers in Construction Management, pp.1409–1417.

6. **Alsulaiman, Y. (2012)** Managing risks in Independent Water and Power Plant Projects in Saudi Arabia. Poster In: *5th Saudi Scientific International Conference, Brunel University, London, UK.* 18th-20th June 2012.

CHAPTER ONE: INTRODUCTION

1.1 Background

The infrastructure development of a country refers to the construction, repair, refurbishment, and modernisation of public utilities such as power plants, water plants, telecommunications, piped water supply, gas pipe lines, drains, roads, and airports. The development of a country's infrastructure and the services it provides are central to the well-being and advancement of the nation (Al-Shaikh and Al-Harkan, 2005).

In this context, it can be understood that the construction sector plays a major part. Indeed, globally, it is considered as one of the major contributors to Gross Domestic Product (GDP). According to Betts et al. (2011), global forecasts suggest that a total of $97.7 trillion will be spent on construction during the next decade, and by 2020, construction will account for 13.2% of world GDP.

The Saudi construction industry is one of the largest in the Middle East and the second largest industry in Saudi Arabia, after oil. Accordingly, it represents a major share of the country's domestic economy. In real terms, the growth of the industry between 2002 and 2007 was between 2.51% to 4.11% annually. However, the global economic downturn brought about numerous project delays and cancellations, with the result that construction sector growth slowed to 1.5% in 2008, while real GDP amounted to SR 58.88 billion. New waves of government investment increased this annual growth rate to 4.7% in 2009, and in 2010 the growth rate increased rapidly to 6.4%, while the GDP reached SR 64.10 billion (NCB, 2011).

Insufficient or underdeveloped infrastructure presents one of the biggest obstacles to economic growth and social development worldwide. Consequently, infrastructure projects are high on government agendas, and the infrastructure-development and investment pipeline is huge. The current global project pipeline is estimated at $9 trillion, one-third of which is in Asia. At the same time, India is expected to spend $550 billion on large-scale projects over the next five years, half of this being in the energy and utility sectors. Developed economies

also have significant infrastructure plans. The United Kingdom (UK), for example, has identified an infrastructure pipeline of over 500 projects that is worth more than £250 billion (Beckers et al., 2013).

The benefits of infrastructure development are undeniable (Betraoui, 2012). For instance, Dubai's property sector owes its double digit growth to its ever-developing infrastructure, and it is now reaping the fruits of those early initiatives that seemed unviable five years ago due to the huge outlays. In terms of data, SR65 billion has been earmarked by Saudi Arabia for the infrastructure and transport sector, representing up 16% over 2012. This includes SR30 billion related to the development of 3,700 km of roads, modernisation of existing ports, construction of regional and international airports and berths, and other infrastructure projects, all of this sowing the seeds for a flourishing property market (Arab News, 2012).

In general, growth in SA is based on the export of oil and gas, and this is also the source of funding for the construction sector. One-fifth of the world's total petroleum reserves are located in SA, and the country's economic boom is being spurred on by growth in major government infrastructures and the development of construction projects.

The World Bank's annual report in 2010 stated that Saudi Arabia is the 13th most economically competitive country in the world. The report has highlighted the rapid rate of economic growth among Middle Eastern countries, especially in the construction industry. Furthermore, Saudi Arabia's economic performance is ranked among the best in the G20. This performance is mainly driven by high oil prices, which strongly contribute to government revenues, enabling the world's largest oil exporter to allocate massive fiscal spending to enormous infrastructure projects, which boost the Saudi construction, real estate, transport, power, water and other sectors. According to the KACST (2009), the Saudi construction industry counts for 8% of the national GDP. The Statistical Year Book for 2010 produced by the Saudi Ministry of Finance, reports that the Government spent SR3,172 billion between 2005 and 2009 on construction projects. More recently at the Real Estate Summit in December, 2012, it was reported that Saudi Arabia had injected a massive $80 billion investment in infrastructure initiatives.

The global demands for water and power have increased significantly, and according to Voelker et al. (2008), many countries around the world are facing significant demands in this respect, which have been estimated at 7% annually for the coming decade, and predicted to double every ten years or so.

The majority of the current WPPs in the global context, and in SA in particular have been undertaken by the public sector, which has financed and operated such projects with minimal involvement from the private sector. Indeed the private sector has only participated in as much as the design and construction of these projects. The USA for example, which is the world's third largest water producer, serves less than 20% of its population via the private sector, and SA as the world's largest producer of water, has only four private projects, in comparison with 34 public ones. The reason for this situation is that the water sector has been among the last of the sectors to be opened up for privatisation. According to Davis (as cited in Prasad, 2007), private sector participation (PSP) in the water sector has been 'late and light' compared to the privatisation of other sectors such as telecommunications and transport.

Nonetheless, in the delivery of other public services, the private sector plays an active role, thus helping to greatly accelerate the development of the infrastructure. This is seen in Saudi Arabia's water and power industry, which has adopted the Independent Water and Power Plant (IWPP) approach in a number of projects to alleviate the pressure on the public sector. In essence, the IWPP strategy refers to the co-operation between government and the private sector to provide public services particularly in the areas of water and power. It is similar in nature to the Public Private Partnership (PPP) arrangement seen elsewhere. PPP is a more comprehensive and integrated regulatory regime since the model is applied to all types of infrastructure project and must, therefore, be capable of accommodating their whole variety (i.e. bridges, roads, water, schools, power, etc.). Some countries have seen the use of PPP through another model. In Europe, for instance, the UK led the progress of PPP through the PFI model, being followed by Ireland, France, Spain, and the Netherlands, all of whom used concessions. According to VTU Energy (2009), the Middle East describes the participation of the private sector in water and power projects as Independent Water and Power Plant (IWPP),

for the purposes of the current study, the researcher has chosen to use the term 'IWPP'. In recent years, the Saudi government has made enormous efforts to create an environment that facilitates the application of this approach. As noted by Smith et al. (2006), this strategy is perceived to have the dual advantages of reducing the requirements for public expenditure on capital projects, and producing projects which can be operated more efficiently.

1.2 Statement of the Problem

With the growing demand for water and power services, and the tight budgets within which many governments must operate, private sector participation alongside the government has emerged as one of the best mechanisms to provide such services within the budget constraints that exist. Yet, all construction projects irrespective of the sector embody an element of risk, and hence, as observed by Kelly et al. (1993), Risk Management (RM) is an essential tool in project management for improving the performance and efficiency of the industry.

Although private sector participation is increasing in the developing countries, and SA is no exception, various problems have been encountered in the use of PPP, partly due to its short history and lack of experience, possessed by many less developed countries. PPP seen here within the context of IWPP which is similar in many respect. In performance terms, it has been shown that despite the IWPP model offering an important solution to the problem of increased water and power service demand, projects conducted via this delivery mechanism are challenging to implement, and there have been failures (Chuan and Messner, 2003). Ogunlana (1997), commenting on this subject has highlighted the fact that the execution of any project through a public private partnership is more prone to risk than under direct government finance.

Even in the developed nations where the idea of PPP originated, there has been much criticism of the system's ability to deliver the promised benefits. Spackman (2002), and Broadbent and Laughlin (2003), noted that in most developed countries the debate about PPP is still conducted in terms of 'public bad, private good' on the basis of selective evidence. For example, some highway projects in Washington and Arizona failed due to strong public

opposition (Levy, 1996). On the other hand, Abdul-Aziz (2001) reported that the privatised National Sewage project in Malaysia failed as a result of the short history of PPP involvement in this area, and a lack of PPP experience and expertise. Several other authors, including Merna and Smith (1994), Birnie (1999), Ng (2000), Li and Akintoye (2003), and Chinyio and Gameson (2009), who reviewed PPP projects in developed nations, present some good arguments highlighting their numerous benefits.

Beckers et al. (2013) recently asserted that most overruns are foreseeable and avoidable, and that many of the problems they observed are due to a lack of professional, forward-looking risk management. Large infrastructure projects suffer from significant under-management of risk in practically all stages of the value chain and throughout the life cycle of a project.

Private infrastructure projects have a history of subjecting investors to major risks and in some cases, to cancellations of the projects which they have been funding (Harris et al., 2003). Delays in project start-up, contract cancellation, and legal disputes have frequently overshadowed the potential success of many projects. Part of the problem in this respect is the lack of any formalised approach to the project risk management process (Tah and Carr, 2000), which Hlaing et al. (2008) pointed out as a crucial challenge since a formal risk management approach is essential to minimise risk. Indeed, in terms of IWPP projects, these must be undertaken with a proper risk management strategy in place, that involves both the public and the private sector (Tah and Carr, 2000; Thomas et al., 2006 and Voelker et al., 2008).

Based on the World Bank's private participation in infrastructure (PPI) figures published in 2010, 64 (35%) water projects, 103 (6%) power projects, and 29% of all the combined water and power projects undertaken between 1984 and 2009 had to be cancelled or fell into disarray. Eleven reasons have been provided by the World Bank for the failure of partnered infrastructure projects, with poor risk management, lack of competition, poor transparency, and complex decision-making being identified as the main issues.

In SA, the procurement of water and power via IWPP schemes is an unfamiliar concept, still in its infancy, and only four such projects have so far been completed. Of these, three were

reported to have failed to meet their allocated time schedules and to complete within the constraints of their budgets (WEC, 2011). Additionally, after awarding the Ras Az Zour project to the IWPP promoter, the Saudi Minister of Water and Electricity announced the cancellation of the project even before construction started (SWPF, 2009). The main reasons given for this was were related to the fact that various problems including delays in project start-up and significant financial and non-financial risks were encountered. Nonetheless, despite this unwelcome experience, SA is currently planning to adopt the IWPP approach for six projects by 2016; and if implemented properly, this strategy will present a win-win solution for all parties involved (the private sector, the government, and the community at large).

Clearly, whilst many IWPP projects demonstrate good performance, many fail. Good performance is indicated by the completion of projects on time and within budget, but the project lifecycle is subject to many variables and unpredictable factors, which emanate from many sources**.** These sources include the short history of IWPP, a lack of experience of IWPP arrangement by the parties involved, the complexity in terms of involvement of various stakeholders, limited competitors, a long negotiation and concession period, long-term financing, environmental conditions, technology issues, the complex interface between water and power, and unforeseen events which can be classified as risk (Wibowo and Mohamed, 2008; Cheung and Chan, 2011).

Whereas globally many researchers have sought to identify the performance level of IWPP projects and the possible reasons for their failure, with many identifying risk factors as major impediments to the success, it is worth noting that in the SA context, little or nothing has been reported in the area of performance evaluation of IWPP projects. This is due largely to the scheme's infancy in the country as four projects are only just entering the operational phase. Not surprisingly therefore, the review of current literature on IWPP reveals that although a few researchers have explored the issue of risk identification and allocation within IWPP projects, none has presented a comprehensive and holistic theoretical or practical model for managing risk in IWPP projects in SA.

Hence, this study is an attempt to conduct an in-depth investigation that examines the risk management process practised in the IWPP projects in the Saudi context.

1.3 Research Aim and Objectives

The aim and objectives of this research are stated below:

1.3.1 Aim

The aim of this study is to devise an organised procedure for the effective management of risks in independent water and power plant (IWPP) projects in Saudi Arabia (SA).

1.3.2 Objectives

To achieve the aim, six objectives are formulated as follows:

1. To establish the current levels of Risk Management knowledge and implementation in the Water and Power Industry in Saudi Arabia.
2. To identify risk factors that affect IWPP projects in terms of Time, Cost and Quality.
3. To determine the barriers to RM implementation in IWPP projects in SA and identify the enablers that could overcome the barriers and improve implementation.
4. To enhance the understanding of how the effective implementation of RM in IWPP projects leads to the achievement of project goals, and of how to produce an effective RM process.
5. To determine the factors affecting the attitudes of people in all IWPP parties in SA towards risk.
6. To develop a model which reflects the critical factors leading to the ineffective implementation of RM in IWPP projects in SA.

1.4 Scope of the Study

This study is focused on three main subjects, these being: Risk Management (RM), Water and Power Plant (WPP) projects and Public Private Partnership (PPP) in the global context, and Saudi Arabia (SA) as the research site, in particular. Clearly, these three aspects of the overall problem are intertwined. In the investigation, the concentration is on IWPP projects, but the

experience of all types of water and power plant is considered, as it is apparent from the literature that the IWPP in the Saudi construction industry is still in the early stages of development, the first project (Shoaiba III), only coming into operation in 2008 (WEC, 2011).

Additionally, the study extends to address the interaction between the parties (both people and organisation) involved in IWPP projects in Saudi Arabia; and the implementation of RM processes in IWPP projects that are operational or completed. The study does not consider technical issues such as the risks of inaccurate cost estimates and forecasts as these are considered beyond the scope of the current study.

1.5 Research Design

Various options are available to researchers, but this study adopts an interpretive approach. This approach assumes that individuals create and associate their own subjective and inter-subjective meanings as they interact with the world around them. Hence, interpretive researchers attempt to understand phenomena through accessing the meanings that participants in their studies assign to those phenomena (Orlikowski and Baroudi, 1991). The interpretive approach is used for this study as it explores the beliefs held by practitioners in IWPP projects concerning RM and why this is not implemented effectively. Some of the key characteristics of interpretive studies are as follows (Angen, 2000):

- They rely heavily on naturalistic methods (interviewing, observation, and analysis of existing texts).
- They ensure an adequate dialogue between researchers and those with whom they interact in order to collaboratively construct a meaningful reality.
- They generally find that meanings emerge from the research process.
- They typically use qualitative methods.

In this study, the variables are largely unknown, and hence, there is a need for the researcher to focus on context, which may shape the understanding of the phenomenon being studied.

This requires the collection and analysis of rich data that cannot be gathered by a quantitative instrument such as questionnaire. Instead, it calls for a qualitative strategy in which data can be drawn out through conversation. Consequently, the study uses the interview technique with a number of experienced practitioners associated with the IWPP projects in SA, and in extracting their opinions to arrive at a new understanding, Grounded Theory as a research methodology is chosen.

"*If someone wanted to know whether one drug is more effective than another, then a double blind clinical trial would be more appropriate than grounded theory study. However, if someone wanted to know what it was like to be a participant in a drug study, then he or she might sensibly engage in a grounded theory project or some other type of qualitative study."* (Strauss and Corbin, 1998, p. 40).

Strauss and Corbin's quote above encapsulates the essence of when it is best to use grounded theory methodology for a research project. This theory provides useful tools to learn about individuals' perceptions and feelings regarding a particular subject area. Quantitative data collected may be useful in measuring attitudes across a large sample, however, it also offers a powerful methodological framework if the aim of the study is to learn about individuals' perceptions just like what is required in the current study.

Grounded theory shares the following characteristics with other qualitative methods, which correspond to those of this study: Focus on everyday life experiences, Valuing participants' perspectives, Enquiry as interactive process between researcher and respondents, and primarily descriptive and relying on people's words (Marshall and Rossman, 1999).

The interview is one of the most commonly recognised forms of qualitative research (Mason, 1996), which is considered to produce 'conversations with a purpose' (Burgess, 1984; Kahn and Cannell, 1957), and which can follow one of three main structures: in-depth, semi-structured, or loosely structured. It can be adopted when the researcher is unable to observe how people interpret the phenomenon or situation, and/or when detailed clarification is required of an issue.

1.6 Thesis Structure

The thesis is divided into six main chapters as illustrated in Figure 1.1.

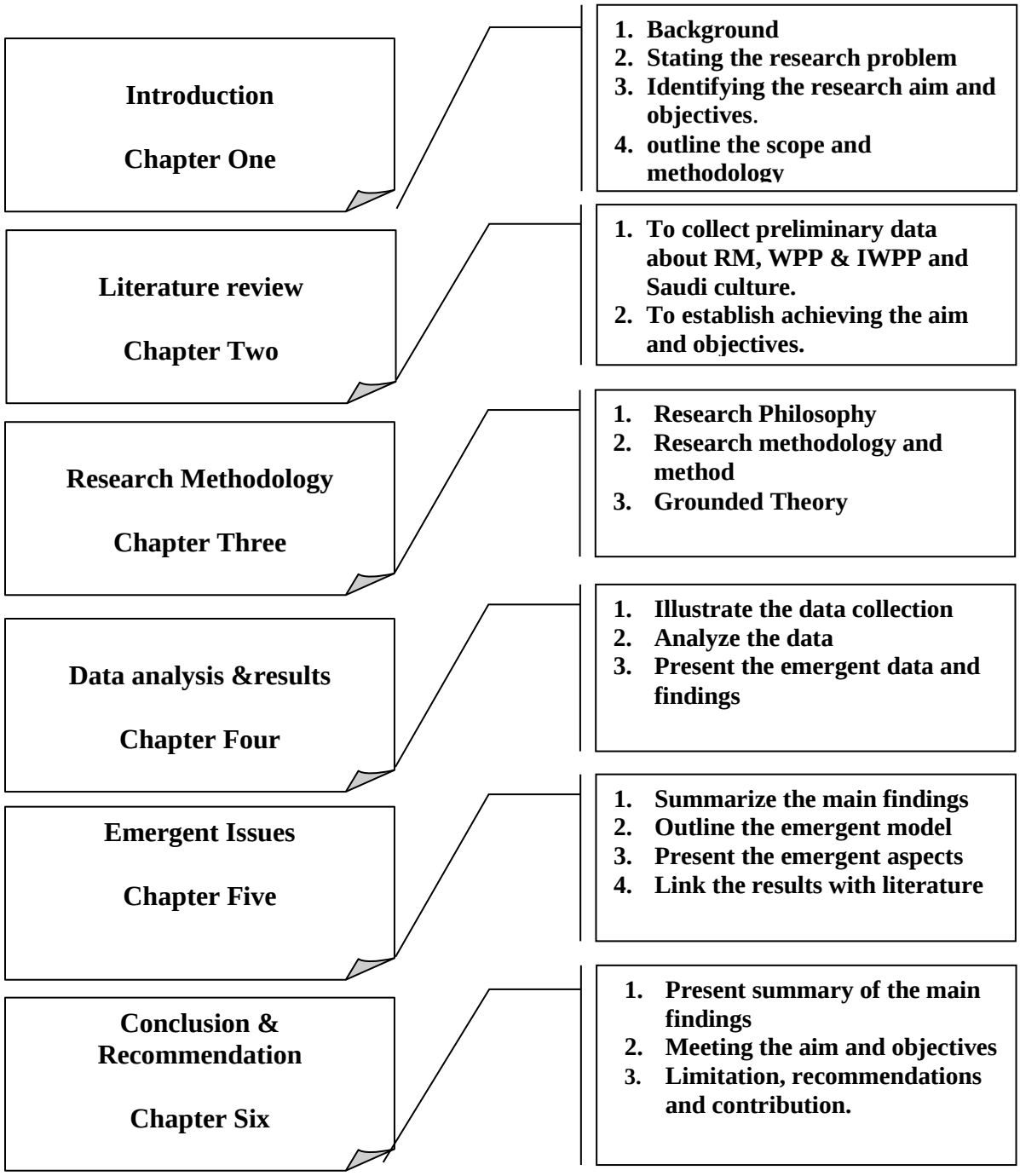


Figure 1.1: Research Structure

The thesis is divided into six main chapters as illustrated in Figure 1.1.

Chapter One: Introduction

This forms the introduction to the research, and offers an outline of the entire process. It gives the background to the study, and details of the particular problem to be investigated. In this connection, it introduces Saudi Arabia as the research context. The aim and objectives of the study are established, and an indication of the research approach and design is presented. The chapter ends by describing the scope of the study, and producing a diagrammatic representation of the structure of the thesis.

Chapter Two: Literature Review

This chapter reviews the existing literature in the area such that a comprehensive grasp of what has been published to date is gained. The chapter is divided into three parts. **Part A** briefly examines the water and power industry in Saudi Arabia, and the mechanism of Independent Water and Power Plant (IWPP) projects, explaining the process, features, and structure associated with these. In this examination, the issues of how water and power projects are perceived in the private sector, the most common problems encountered in this context, and the critical success factors that have been identified in respect of IWPP projects are discussed. **Part B** focuses on Risk Management, considering the different approaches to this, and how it has developed globally. Some important models are introduced and discussed, and the issue of RM as practised in the Saudi construction industry, and specifically in the water and power industry, is investigated. This entails an exploration of the risk factors associated with construction, water and power, PPP, and IWPP. **Part C** of the chapter considers the role of national culture on the behaviour of individuals in the workplace. From this treatment of the literature and the consideration of the Saudi context, the research gap is clearly defined, and a consequent need for the study highlighted.

Chapter Three: Research Methodology

Chapter Three is divided into two parts. **Part A** presents the research approach which explains in general, the methods available to the researcher, and considers the relative merits and disadvantages of these. **Part B** provides details of the actual research methodology adopted for the study that being the Grounded Theory (GT) approach. In doing this, the chapter considers the stages involved in GT, presents a justification for using the approach, gives

detail of the samples and data collection procedure, and finally considers saturation as a concept within GT, and the techniques of analysis the method implies.

Chapter Four: Research Analysis and Findings

In this chapter, explanations are provided of the three rounds of interviews that were conducted. The purpose of each set of interviews is presented, and the samples involved are clearly indicated. All the emergent themes are presented from their initial development in Round 1, to their maturity in Round 3, when saturation was presumed to have been reached. As a means of demonstrating each emergent theme, quotes from the practitioners involved in the interviews are included. Hence, the main findings from the data collection appear in this chapter and are discussed.

Chapter Five: The Emergent Issues Associated with Ineffective Risk Management in IWPP Projects in SA

This chapter presents the emergent model of RM implementation in IWPP projects in SA, thus highlighting the ineffectiveness of the current practice. Additionally, it summarises the main findings and links the emergent themes to the literature in order to strengthen the results and contribute towards filling the gaps in the literature.

Chapter Six: Conclusion and Recommendations

This final chapter draws the thesis to a close. It reports the thesis findings and the conclusions arrived at based on these, and explains how the research aim and objectives have been achieved. Additionally, the way in which the study outcomes have contributed to the body of knowledge is indicated, and finally, the limitations of the research are outlined, from which recommendations for further studies are made.

CHAPTER TWO: LITERATURE REVIEW

2.1 Outline

This chapter proceeds from the introduction to the research study, by reviewing the literature pertaining to the issue being explored, this being RM in Water and Power Plant projects. It is divided into three parts as follows:

- Part A: Water and power plant projects
- Part B: The Management of Risk
- Part C: The Saudi culture.

From a discussion of the literature in Parts A, B and C, the gaps in the overall body of knowledge are identified.

Part A: Water and Power Plant Projects

2.2 Introduction

Nowadays, the global demands for water and power are greatly increased, and according to Voelker et al. (2008), many countries in the world are facing significant demand growth for these utilities, which has been estimated at 7% annually for the coming decade, and as doubling roughly every ten years. In order to meet this huge demand, investments in the water and power sectors are urgently needed. However, especially for the developing countries, this is a large problem since an increasing number of water and power plants will have to be built to meet the demand, and these facilities incur high capital requirements (Zhao et al., 2009). According to the United Nations (2015), as the global economy grows, the world will require much more water, and if steps are not taken to cut back on fresh water use now, by 2030 the world will have 40% less fresh water than it needs.

Population growth and increased urbanisation contribute to the increased demand for water and power. In fact, water demand tends to grow at double the rate of population growth. The global population is expected to grow to 9.1 billion people by 2050, up from the current 7.2 billion. More people living in cities also create a strain on water supplies. The UN report estimates that 6.3 billion people, or about 69% of the world's population, will be living in urban areas by 2050, up from the current 50%. However, the biggest drain on water resources is agriculture, which uses about 70% of the world's fresh water supplies. Tapping into groundwater supplies to make up for surface-water deficits stretches resources, yet as indicated in the UN report, 50% of the world relies solely on groundwater to meet basic daily needs, and 20% of the world's aquifers are already over-exploited. Indeed, the issue of water scarcity rose to prominence again recently when a NASA scientists warned that drought-stricken California only has about a year's worth of water left (UN, 2015).

With a population forecast to reaching 29.3 million by 2015 in SA, the supply of fresh water is essential to the Kingdom, a desert country with a large agricultural and industrial base. As the largest country in the world without running surface water, SA has been dependent on desalinated water for potable water since the 1950s. Today, SA is the world's largest producer of desalinated water and home to the Marafiq plant, the world's largest independent water and power plant project (IWPP) which began operation in 2008. Moreover, Saudi Arabia has just launched one of the world's largest water and power plants, the Ras Alkhair plant, producing one million cubic meters per day (cum/d) of water, and 3750 KW of power for the capital of Riyadh, and other cities (SWCC, 2015). In fact, this project was planned to be conducted through the IWPP approach but due to certain problems (discussed in section 2.4.8), it was eventually decided to procure the plant by EPC.

Power consumption in SA increased sharply during the 1990–2010 period due to rapid economic development. Peak loads reached nearly 24 GW in 2001 - 25 times their 1975 level - and are expected to approach 60 GW by 2023 (EIA, 2007). Consequently, there is an urgent need to build new plants to satisfy these needs, and the investment required in this respect may exceed $90 billion. Nonetheless, the looming energy shortage requires SA to increase its capacity, and that is planned to be increased to 120 GW by 2032 (KACARE, 2014).

As water and power become increasingly scarce resources, issues of water quality, quantity, management, and planning, must be effectively addressed in order to provide for the future of the Kingdom's growing population. However, it is not only the mounting demographics which have an impact in this respect, since industrialisation and modernisation have also placed increasing pressure on SA's water infrastructure. Indeed, official sources indicate that an average of 20% of the Kingdom's water is unaccounted for due to a 25-year old infrastructure and resultant leakages. Furthermore, a low tariff of only $0.027 (SR0.10) per cubic meter of water encourages non-rationalisation of water consumption, and a lack of thought among the general population for the value of the resource.

These challenges have paved the way for the restructuring and gradual privatisation of the country's water and power sector, which has arisen largely through the establishment of public-private partnerships (PPPs); and while the global economic downturn recently led the Kingdom to bring a number of projects back under government control, it is nonetheless recognised that PPPs or IWPP projects will remain instrumental in developing the industry and delivering water and power services to residents throughout the country. With the establishment of IWPPs, private investors are presented with a wealth of opportunities.

Public-Private Partnerships (PPP) is a generic name that is being applied to several different types of contractual agreements between the governments and the private sector for the purpose of public infrastructure development and services provision. A long time provider of goods and services to the government through traditional methods of procurement and privatisation, PPP sees the private sector increasingly taking on activities previously considered the exclusive responsibility of the State, as the State becomes the "buyer" rather than the supplier of services. As the word "partnership" suggests, the aim is to create an infrastructure "dream team" by combining the best capabilities of the public (legislation, regulations, social concern) and private (innovation, efficiency, finances) sectors to find a solution to infrastructure-related public needs. PPP therefore describes the structure of the relationship between the two parties and ensures that the best of both contributes to optimal public services. What this involves and the part each of the parties will play in a project is

obviously highly contextual, but there are some general principles that frame a PPP and separate it from other procurement methods. The last 20 years have seen the rise to power of public-private partnerships (PPPs) as a means of crowding in investment and expertise from the private sector to the delivery of public goods and services. This trend is likely to continue following the 2007–2008 global financial crisis that sees many jurisdictions strapped for cash and seeking alternative methods of meeting the increasing demands for investment in public sector development (Colverson and Perera, 2012).

There is no one single, concise definition of PPP. Accurately defining a PPP is problematic because by nature it is a contextual (relative) concept, responding to the institutional, legal, investment and public procurement settings of different jurisdictions, whilst also considering the contextual nature of individual agreements. From this it can be deduced that IWPP is a subset of PPP the only difference being IWPP specialises in the provision of combined water and power services.

As in other developing countries, growth in electricity demand in SA is above gross domestic product (GDP) growth, and at 8% is particularly high. Air-conditioning needs mean that electricity demand in the summer is around 40% higher than in the winter, and base-load and peak-load demands differ widely between day and night. Consequently, the total installed power capacity needs to be considerably above base-load requirements (Woertz, 2013).

2.3 An Overview of Water and Power Plant

2.3.1 Water Plant

Desalting refers to a water treatment process that removes salts from water, and which is also called desalination or desalinisation (Buros, 2000). The process can be performed in several ways but the result is always the same – the production of fresh water from brackish water or seawater. Throughout history, people have continually attempted to treat salty water so that it could be used for drinking and agriculture. Awerbuch (2009) states that 97.5% of the entire globe's water is salt water and only 2.5% is fresh. Of the latter, about 68.9% is in glaciers and

permanent snow covers, and 29.9% is fresh groundwater. The remaining 1.2% is renewable freshwater and other sources such as moisture.

A major step in development came in the 1940s, during World War II, when various military establishments in arid areas needed water to supply their troops. The potential that desalting offered was recognised more widely after the war and work was continued in various countries. The American government, through the creation and funding of the Office of Saline Water (OSW) in the early 1960s, and its successor organisations like the Office of Water Research and Technology, made one of the most concentrated efforts to develop the desalting industry (Al-Mutaz, 1991).

By the late 1960s, thermal-driven units were beginning to be installed in various parts of the world to be used to desalt sea water, but in the 1970s, commercial membrane processes began to be used more extensively (Al-Deffeeri and Al-Thafiri, 2005).

By the 1980s, desalination technology was a fully commercial enterprise. The technology benefited from the operating experience achieved with the units that had been built and operated in the previous decades, and by the 1990s, the use of desalting technologies for public water supplies had become commonplace.

A variety of desalting technologies has been developed over the years and, based on their commercial success, they can be classified into the major and minor desalting processes as follows (SWCC, 2013):

- **Major Processes**:

A - Thermal

- Multi-Stage Flash (MSF)
- Multiple-Effect Distillation (MED)
- Vapour Compression (VC)

B - Membrane

- Electro dialysis (ED)
- Reverse Osmosis (RO)

❖ **Minor Processes**

- Freezing
- Membrane Distillation
- Solar Humidification

Desalting equipment is now used in over 100 countries. According to the Inventory conducted by International Desalination Association (IDA) (as cited in Awerbuch, 2009), ten countries have about 71% of all the capacity. More than half of this desalting capacity is used to desalt seawater in the Middle East and North Africa. Saudi Arabia ranks first in total capacity (about 22.4% of the world's capacity), with most of it being comprised of seawater desalting units that use the distillation process. The United Arab of Emirates (UAE) ranks second in overall capacity, with about 13%, and this is followed by the United States of America (USA) with 12.9% (most of the capacity in the USA consists of plants in which the RO process is used to treat brackish water). Spain ranks fourth with 8%, at the fifth position is Kuwait with 5%, and the remaining countries have less than 4% of the world's capacity.

The Inventory indicates that the world's installed capacity consists mainly of the MSF distillation and RO processes, which together account for about 86% of the total capacity. The residual 14% is comprised of the MED, ED, and vapour compression processes, while the minor processes amount to less than 1%.

Multi-stage flash distillation, commonly referred to as the MSF process, accounts for most of the desalting capacity to distil fresh water from seawater. The MSF concept has allowed various forms of distillation to be successful in locations around the world, but of all the available methods, the multi-stage flash distillation is a proven method.

The MSF-type desalination plants may be operated independently (single purpose) or linked to power stations (dual purpose). In such plants, the largest single item of cost relates to the

heat exchanger tubes (Ahmad, 1984), and it is known that the MSF system is not energy efficient, since as noted by Darwish (2001), it consumes about three times the equivalent energy consumed by reverse osmosis (RO), which only consumes mechanical (pumping) energy.

2.3.2 Power Plant

A power plant or a power generating station is basically an industrial location that is utilised for the generation and distribution of power on a mass scale, usually in the order of several thousand Watts. Such stations are generally located in sub-urban regions or several kilometres away from the cities or the load centres because of the pre-requisites of huge land and water volume, along with several operating constraints, for example the need to accommodate the waste disposal. Given their location, power generating stations must not only be efficient in the generation of power, but must also be able to transmit that power efficiently over the entire distance from the station to the recipients. Nearly all power plants have an AC generator or an alternator, which is basically a rotating machine that is equipped to convert energy from the mechanical domain (rotating turbine) into the electrical domain by creating relative motion between a magnetic field and the conductors. The energy source harnessed to turn the generator shaft varies widely, and is chiefly dependent on the type of fuel used. The types and characteristics of power plants are briefly highlighted as follows:

- **Types of Power Plant**

A power plant can be of several types depending mainly on the kind of fuel used. Since for the purpose of bulk power generation, only thermal, nuclear, and hydro power is useful, a power generating station can be broadly classified as one of these three types (SEC, 2015).

The thermal power plant or coal-fired thermal power plant is by far the most conventional method of generating electric power with reasonably high efficiency. It uses coal as the primary fuel to boil the water available to superheated steam for driving the steam turbine.

The nuclear power plant is similar to the thermal station in several ways, but there is a difference in terms of the primary fuel used, since in this case, radioactive elements like uranium and thorium are used. Additionally, the furnace and boiler present in the thermal power plant are absent in the nuclear plant, being replaced by the nuclear reactor and the heat exchanger tubes.

2.3.3 The Dual Purpose Plant

The dual purpose of the water and power plant concept is the combination of these processes in order to provide a better solution, that being a lower cost product than either alone can provide (Awerbuch, 2005). However, as observed by Hamed et al. (2006), although dual plants have proven to be more thermodynamically efficient and economically feasible than single purpose power generation or water production plants, they are complex operations.

The idea of combining power and water has been reported in several publications in the 1980s, and some significant advantages have been noted by researchers (Heinz, 2003; Awerbuch, 2005) as follows:

- They require the lowest amount of total investment.
- They allow flexibility in production.
- They provide power and water at the lowest cost.
- They minimise fuel consumption and increase the power plant efficiency.

In addition, the dual approach of power and water plants makes use of thermal energy extracted or exhausted from power plants in the form of low pressure steam to provide heat input to thermal desalination plants for multistage flash (MSF) or multi-effect (MED) distillation processes.

The electrical energy can be effectively used in the electrically-driven desalination processes like reverse osmosis (RO), and vapour compression distillation (VCD).

In the Gulf region there are unique conditions in which peak demand for electricity rises significantly during the summer mainly because of the use of air-conditioning, and then drops dramatically in the winter to 30-40% of summer capacity, and as noted by Heinz (2003), this sharp decrease creates the situation where over 50% of power generation is idle. In contrast, the demand for desalinated water is almost constant. Water can be stored but it is impractical to store electricity, and hence, excess electricity can be diverted to water production incorporating the electrically-driven technology of sea water reverse osmosis (RO) and/or vapour compression distillation (VCD) combined with the low pressure steam-driven technology of MSF or MED, thereby making it advantageous to design integrated hybrid plants.

2.4 Privatisation of Water and Power Plant

The purpose of this section is to provide a greater understanding of a focused approach to the privatisation of the water and power sectors by outlining the structure and process required and by illustrating the benefits and problems entailed.

2.4.1 Introduction

It has already been indicated that global demands for water and power have increased dramatically, that such growth is estimated at around 7% annually in many countries, and that after the next decade this could double, and double again the following decade (Voelker et al., 2008). The only way to begin to meet this enormous challenge is to invest in the power and water sectors and to do so without delay, meaning that for the developing countries especially, this is a very large undertaking given the cost of construction of power and water plants with their very high capital requirements (Zhan et al., 2009).

The involvement of the private sector is one way to alleviate this problem to some extent, since as noted by Voelker et al. (2008), the privatisation of these services accelerates the development of the water and power sectors. Such private investment in infrastructure has increased rapidly over the past few decades (Lamech and Saeed, 2003). Indeed, as shown by a

survey on PPP opportunities in Asia, with the exception of a few key countries, a sharp increase in PPP projects in Asia is evident (Harris, 2004).

Through the growing synergy between power and water, and the opening of the sector to private investment, the way has been paved for the launch of a number of Independent Water and Power Plants (IWPPs) in a number of countries. The presence of these IWPPs is believed to ensure the continued growth of the power and water sectors, and with their governments' support and encouragement, local and international companies are collaborating to pool their resources, investment and technical expertise in order to contribute towards the achievement of this objective (Marafiq, 2009).

2.4.2 The Concept of Privatising Water and Power Projects

The privatisation of water and power projects involves co-operation between government and the private sector to provide public services via the public infrastructure. Chu (as cited in Merna and Smith, 1999) described the privatisation of a project by saying the relationship was based on the granting of a concession by a principal to a promoter who is subsequently responsible for the construction, financing, operation and maintenance of a facility over the period of the concession before finally transferring at a certain or no cost, a fully operational facility to the Principal. He continued to include the fact that during the concession period the promoter owns and operates the facility and collects revenues in order to repay the financing and investment costs, maintain and operate the facility, and make a margin of profit.

Chiu (2006:4) describes the Public Private Partnership (PPP) as:

> *"a contractual agreement between a public agency (federal, state or local) and a private sector entity. Through this agreement, the skills and assets of each sector (public and private) are shared in delivering a service or facility for the use of the general public. In addition to the sharing of resources, each party shares in the risks and rewards potential in the delivery of the service and/or facility."*

The typical PPP approach involves the government in granting a concession for specified new infrastructure to a private sector entity, a bidding consortium, or a project company. In turn, the concessionaire finances, designs, and constructs the infrastructure, and operates it for a certain period of time (generally 20 to 30 years) to pay off the capital debt and earn a reasonable rate of return from the operating revenue, and then the concessionaire transfers ownership of the infrastructure to the government free of charge or at an agreed price at the end of the concession period (Chuan and Messner, 2003).

There are several different terms in use that describe the type of privatisation seen in infrastructure projects, such as: Build-Operate-Transfer (BOT), Private Finance Initiative (PFI), Public-Private Partnership (PPP), Independent Water and Power Plant (IWPP), and others. However, PPP is a more comprehensive and integrated regulatory regime since the model is applied to all types of infrastructure project and must, therefore, be capable of accommodating their whole variety (i.e. bridges, roads, water, schools, power, etc.). Some countries have seen the use of PPP through another model. In Europe, for instance, the UK led the progress of PPP through the PFI model, being followed by Ireland, France, Spain, and the Netherlands, all of whom used concessions. On the American continent, models of PPP also evolved in Canada, and the USA. Moreover, developing countries in Africa and the Asia-Pacific area have also seen the use of PPP, particularly through the BOT model (Chen and Wang, 2009). According to VTU Energy (2009), the Middle East describes the participation of the private sector in water and power projects as Independent Water and Power Plant (IWPP), and in the case where only power is involved, Independent Power Plant (IPP). Fyfe (1999), and Chu (1999) have identified several alternative names for PPP, such as Build-Operate-Deliver (BOD), Finance-Build-Own-Operate-Transfer (FBOOT), Build-Own-Operate-Transfer (BOOT), and Build-Transfer-Operate (BTO).

2.4.3 The IWPP Structure

The typical organisational and contractual structure of an IWPP project is shown in Figure 2.1, which is adapted from Chu (1999):

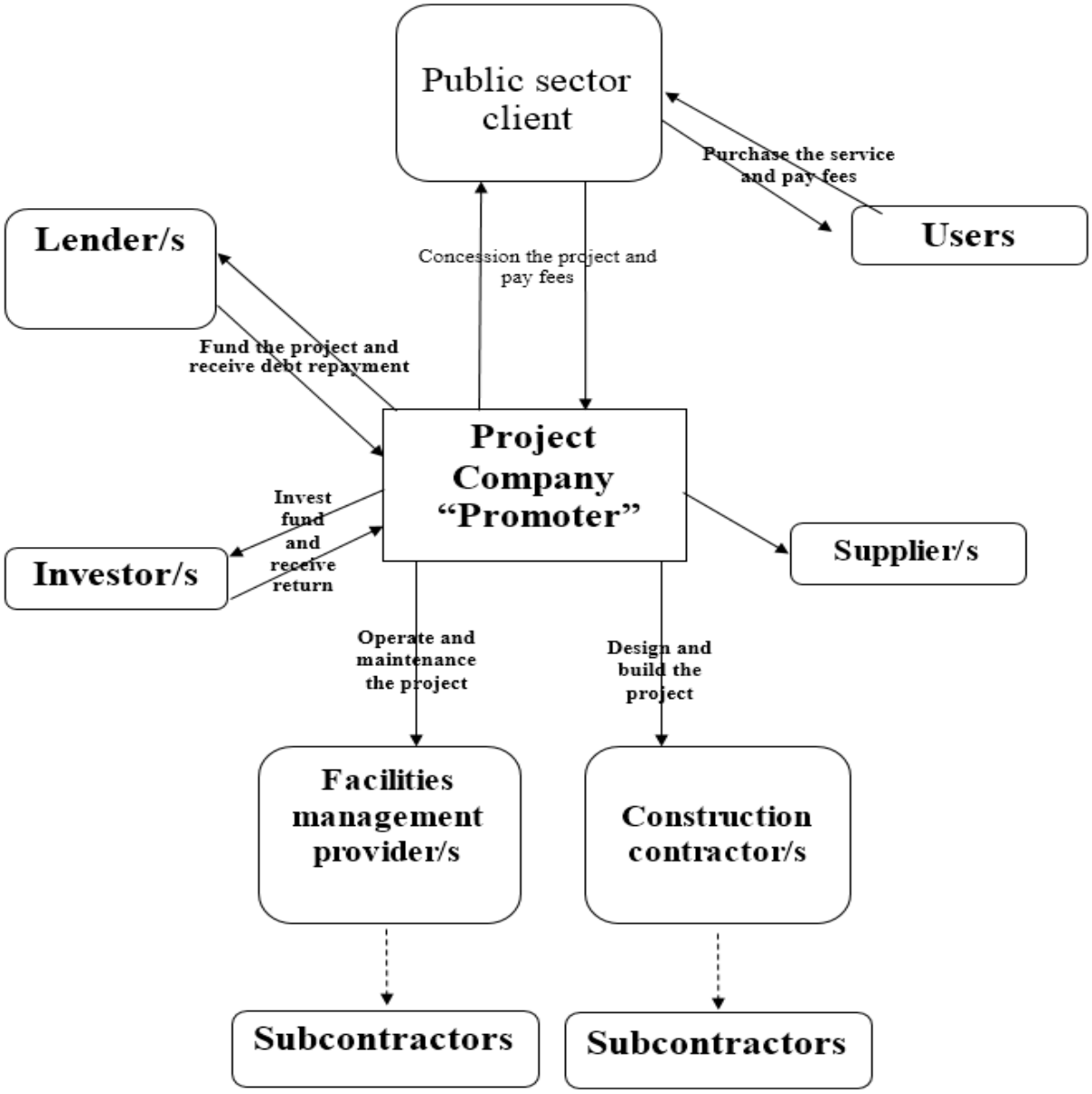


Figure 2.1: Structure of an IWPP Project

It is clear that the IWPP structure comprises many agreements formed between different types of organisation. A single contract is established between the public sector and the private sector company (called the Project Company or Promoter), which is usually a large organisation or an assembly of several private sector organisations that possess the necessary skills and financial strength to fulfil the project requirements throughout the service period, and that come together to form a consortium. This consortium is formed as a legal entity

specifically for each project to provide water and power to the public sector client. Additionally it is responsible for arranging the required funding for the plant. It comprises all the necessary organisations required to provide and facilitate the delivery of the services. For example it will include the lenders who provide the financing, and any other investors as shareholders who make up the shortfall in capital. Additionally, it will appoint a construction organisation to design and construct the plant, and a facilities management organisation to operate the plant throughout the agreed service period of typically 20 to 30 years.

Lenders and investors who provide the capital required to construct the plant, expect to be repaid with interest. If they exist as part of the consortium, they receive dividends. Such consortia are keen to ensure the success of their projects so that their investments will be rewarded. Hence, they may influence the design, operation and maintenance, and management of the plant concerned in an effort to guarantee that the project will perform as specified by the client. Furthermore, funders will focus intensely on all aspects of the project agreement, particularly the services level specification, the payment mechanism, and the performance monitoring regime, in order to determine that the terms of the contract are commercially acceptable.

While IWPP projects are becoming increasingly attractive to a growing number of countries globally, they are complex and demand a high level of communication among the organisations involved, and as seen above, these projects do involve many parties from both the public and private sector. Consequently, effective co-ordination is an extremely important daily concern, the the project company should play vital role in facilitating and ensuring such co-ordination occurs between all parties (Chuan and Messner, 2003). That said, the IWPP approach is not seen as having a rigid structure, and when introduced to deliver a specific project, it must be strategically adapted to accommodate the existing social, legal, economic, political, and technological (SLEPT) environment.

2.4.4 The IWPP Process

IWPP projects generally evolve through a series of different phases as illustrated by VTU (2009) and Chu (1999) in Figure 2.2:

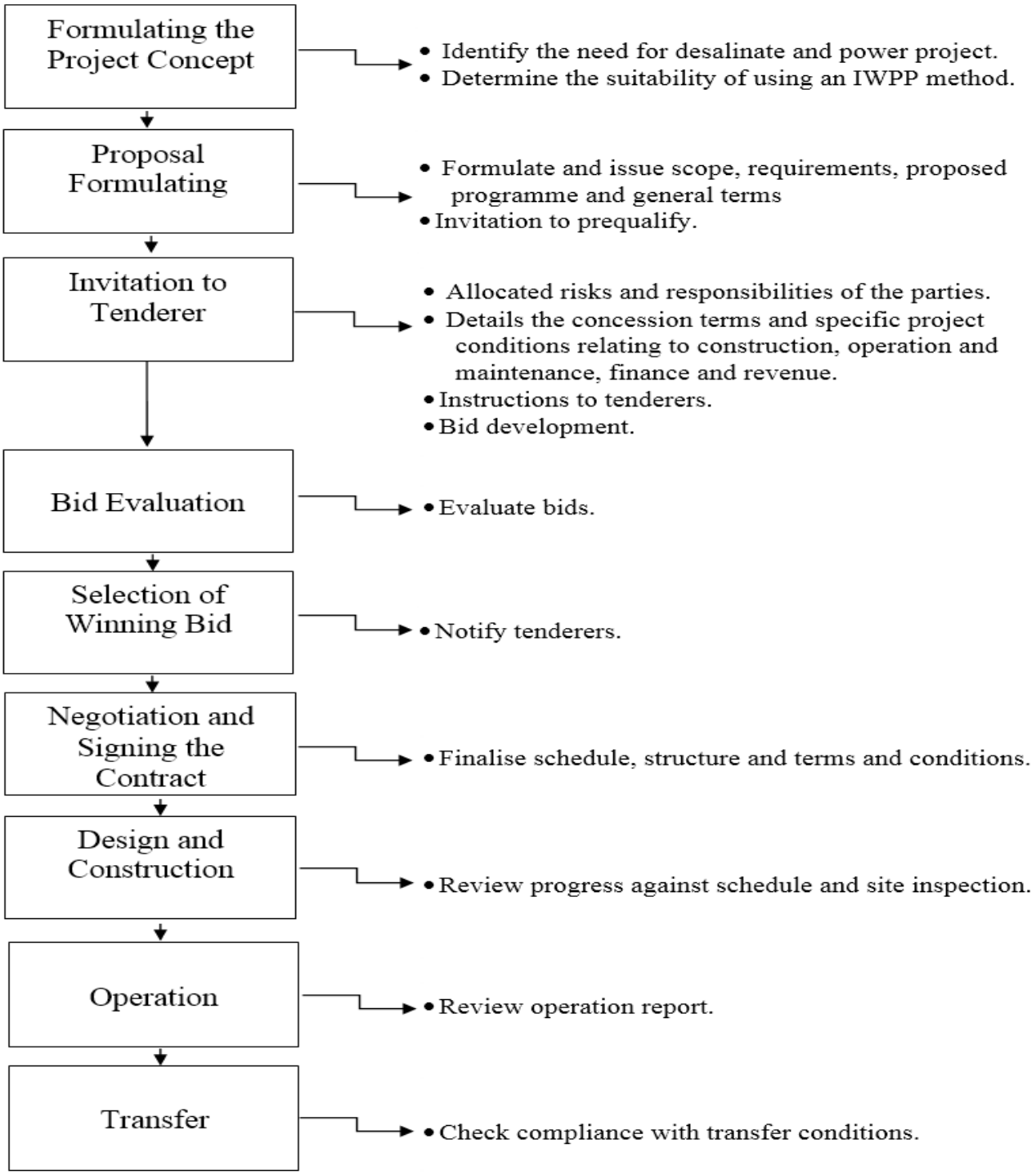


Figure 2.2: Phases of an IWPP Project (adapted from VTU (2009) and Chu (1999))

Figure 2.2 summarises the various phases of an IWPP project from the initial concept to the transfer of the plant to the public sector which normally takes 20 to 30 years. Firstly, the identification of the need for a particular water and power plant usually starts well before the official invitation to tender is released. In this early step, the suitability of applying the IWPP strategy is considered, bearing in mind any political or social issues, the likely public acceptance of the project, and the comparison of costs and benefits between this strategy and other procurement methods.

Once the project concept is clarified, the formulation and issue of the preliminary proposal begins. This contains the scope and requirements of the project, the proposal programme, and general issues. Subsequently, an invitation to tender is released as a means of defining the terms and project conditions for construction, operation, maintenance, and finance. At this stage, risks must be allocated, and the responsibilities of all parties defined. Moreover, instructions to contractors wishing to tender, and the criteria for awarding the project must be clarified in this step. When the competitors know the detailed project requirements, they produce their tenders and submit these. The bid evaluation phase follows the receipt of bids, and at this point all submissions are assessed, comparisons are made between competitors, and one bidder is selected according to the stipulated criteria. Thereafter, the contract is negotiated and signed. This includes details of the price structure, time schedule, terms and conditions, final performance of the plant, and finalisation of the guarantees. When the contract has been signed, the design and construction commence, but this cannot occur without complete government approval since ultimately the plant will be transferred to the government once the concession period of 20-30 years has expired, and the government needs to be assured that the project will actually deliver on time as the water and power needs of the nation depend upon it. Monitoring by government occurs via ongoing site inspections and reviews of the project's progress. Once the construction of the plant finished, the operation phase begins, and reports of the operation are reviewed, and maintenance records checked. Finally, the whole project is transferred to the public authority after the transfer conditions have been checked.

IWPP projects are relatively more complex to establish than other projects. They usually take longer time to develop as the documentation required for their implementation is extensive and normally involves lengthy negotiation (Chu, 1999). The structures implicit in IWPP projects entail a higher degree of private participation and render significantly more benefits to both the public and private sectors compared to traditional structures. Due to these potential benefits, the IWPP approach has attracted much attention from industry, government, and academia (Chuan and Messner, 2003).

One of the main benefits of IWPP projects is that the various risks associated with them are transferred to the party or parties best able to manage them. A well designed IWPP project contract shares all types of risk, and in this respect, responsibilities are negotiated at the contracting stage, assessed on a case-by-case basis, and assigned to the parties most competent to manage each particular risk. In general, the private sector company that provides the services is responsible for the majority, if not all of the risks associated with the capital cost, the time required to construct the project, and its performance and cost throughout the services period (Silk and Black, 2002).

It should be noted that significant costs are involved in bidding for IWPP projects. The process requires the development of a detailed proposal in response to public sector specifications, complex contractual and financing documentation, and lengthy negotiation through the various phases. Not surprisingly, the eventual bid generally costs a contractor much more than it would for a non-IWPP project.

2.4.5 Main Benefits of IWPP Projects

As a procurement strategy, the IWPP approach can offer a number of advantages to the principal. The major ones are noted by Sapte (1999) as being:

- Opportunities to realise efficiency gains arising from the management skills and innovative solutions (operations-driven or design-based) offered by the promoter;

- Greater incentives for the control of construction, operating, and maintenance costs, which means lower operating cost and working capital;
- Additional finance that accelerates the development of economically justifiable projects and that allows for more projects to be implemented;
- Allocation of risks associated with the implementation of the project to the party that is best able to manage and minimise it, thereby bringing about greater efficiency and cost savings over the complete project life cycle.

According to Chen and Wang (2009), the IWPP approach can help to resolve the conflict between the strong demand for water and power, and the shortage of public funding. Being short of capital is one of constraints impeding the development of the power and water sectors. Hence, the IWPP mode provides a method of financing that can overcome the financial problems encountered in development and operation (Zhao et al., 2009).

Other potential advantages are identified by Chu (1999) as follows:

- Integration of innovation in design and operational needs;
- Access to new technology;
- Better match between supply and demand;
- Enhanced project economics through alternative uses or collateral commercial ventures;
- Optimal use of scarce resources through clear price signals and user-pay principle;
- More control over the quality of services;
- Greater focus on core business;
- Use of more effective business processes and cost control procedures;
- Quicker project delivery.

Fyfe (1999) confirms the above advantages of IWPP in the following points:

- Obtaining the project at the lowest cost given the fully competitive bidding situation;

- Transferring the risks to the private sector;
- Using the best management skills in the construction and operation of the project;
- Obtaining access to the latest technology.

Most other types of contract suffer from inefficient facilities, inadequate services, and limited budgets, whereas the IWPP approach provides an attractive option for the upgrade, redevelopment or procurement of water and power projects (Chu, 1999). Moreover, Harris (2004) states that the benefits of private investment are very clear at the beginning of a project since the private organisations (that are mostly foreign-owned) bring in new technology and capital.

2.4.6 Main Problems with IWPP Projects

Nonetheless, although IWPP projects have many advantages as indicated, they have many implicit challenges, one being that they are relatively more complex to set up (Chu, 1999), as already documented, and another being the length of time to develop them given that the paperwork is much more extensive than with other types of project model and normally requires lengthy negotiation (Voelker et al., 2008). Additionally, such negotiations demand resources and human skills as they require time, money, patience, and sophistication. In Indonesia, for example, this period of time was typically known to be more than 800 days, but according to Minister Sugiharto in 2006, through improvements to the process of IWPP project tendering, this has now been reduced to 12 months. These improvements were demanded of the industry by Minister Sugiharto, in his comment that "*No slippage can be tolerated, otherwise we will be experiencing power shortages in 2009*" (Voelker et al., 2008:24). And on the general subject of negotiations in respect of IWPP projects, Jian (2009) has confirmed that these do usually last between one and two years, and can even extend up to five to six years, depending upon the scale of the project concerned.

Another problem is that in some countries, the IWPP approach has become increasingly popular in recent times, whilst in many others, the concept of procuring water and power by

IWPP schemes is still relatively new and unfamiliar (Chu, 1999), and there has not been enough done in the way of feasibility studies, yet the governments of some of these countries are committed to making these reforms happen, with insufficient knowledge and expertise available for their development.

In addition, in developing countries, private foreign firms do encounter certain problems. These can be seen as a lack of knowledge of local work practices, project procurement systems, cultural norms and values; a lack of local technical expertise especially in relation to safety and quality procedures; a lack of understanding of the legal and financial aspects of convoluted contractual structures (Scott, 2001), any of which can promote serious problems for their projects. As a result, most foreign companies are not willing to proceed without a clear path allowing them to access to direct international industry. Nor are they prepared to go ahead without clearly-defined procedures to invoke in respect of risk (Voelker et al., 2008). Furthermore, unclear rules regarding property rights and a lack of regulation can also lead to problems (Harris, 2004). The difficulty of writing a new contract for each project also results in high bidding costs and the time-consuming nature of this activity, stand as another important barrier to companies considering whether to bid for IWPP projects. The presence of a standard contract would help to overcome this particular problem, as noted by Shapiro (cited in Harris, 2004:6), who in discussing the globalisation of legal frameworks, suggests that there is *"some movement towards a relatively uniform global contract and commercial law".*

At the same time, there is a possibility that a perception could develop among the local people and government officials that the costs of private investment in infrastructure are high and that the country's wealth is being drained (Harris, 2004). This might result in hostility towards private contractors, especially foreign ones that may well be enough of a deterrent to totally prevent them from showing any interest in a project.

In fact, however, private infrastructure projects do have of subjecting investors to major risks and in some cases, to project cancellation (Harris et al, 2003), so the feeling among the general public may have a justifiable basis. It has been seen that delays in project start-up, contract cancellations, and legal disputes have frequently overshadowed the potential success

of many projects. Commenting on these inherent problems, the UK-based consultancy firm Merchant International Group published a report in early 1999 estimating that multinational companies lost about US$24 billion during 1998 in their foreign private infrastructure investment activities because of specific emerging market country risks (Irwin et al., 1997; Harris, 2004).

These lessons can affect the success of a private participant in a water and power project, and having been taken on board, they can be used to improve IWPP viability and provide valuable information to many countries that are currently structuring policies for private participation in infrastructure (Chuan and Messner, 2003).

2.4.7 Critical Success Factors for IWPP Projects

Projects conducted via the IWPP approach have met with varying degrees of success. It is, therefore imperative to understand the factors contributing towards the success of this type of project (Zhao et al., 2009). Clearly, the IWPP is an imported concept in many countries, and therefore, it is potentially alien. Hence, even though the IWPP framework has been successfully tested in other countries, the framework must be structurally adjusted to accommodate the prevailing social, legal, economic, political, and technological (SLEPT) environments of developing countries, such as Saudi Arabia. To expand IWPP application and improve the potential for project success, it is important to scrutinise and learn from the experience of previous IWPP projects (Chuan and Messner, 2003).

Jian (2009) argues that the smooth implementation of a project from its design, through the construction phase to test run, and up to the eventual commercial operation, cannot be achieved without the support and guidance of governments and the participation of experienced experts. Specifically in water and power projects, government support is key in striking the correct balance between the potential risks and returns (Zhao et al., 2009). Furthermore, it is important for government to establish in advance, the standard required in respect of the technical proposal in the bid document.

Another crucial success factor is noted by Voelker et al. (2008) as being the quality of risk management as practised by both the public and the private sector. That said, in the context of developing countries, the optimum risk allocation between the various parties involved, and the creation of a robust legal framework sometimes take longer to achieve. In particular, political risks are of major concern due to the close and long-term co-operation between the private sector and the public authorities.

According to Zhao et al. (2009), there are several issues to be considered well before bringing any IWPP project into being, as follows:

- the necessity for the project,
- the level of project financing,
- the management of the project company,
- the financial capacity of the contractor,
- the level of business operation, and
- the qualifications of the contractor.

The number of real IWPP projects remains very small, and as noted by Chuan and Messner (2003), many improvements are still required to promote the application of the IWPP model. However, lessons are being learned from the existing projects, and building upon the knowledge gained from the varying degrees of success experienced with IWPP projects, governments are shifting and revising their delivery approach to improve the potential for success (Chuan and Messner, 2003).

2.4.8 IWPP Performance

In performance terms, it has been shown that despite the IWPP approach offering a vitally important solution to the problem of increased water and power service demand, projects conducted via this mechanism are especially challenging to prepare, to analyse, to tender, to contract, to finance, and to implement, and there have failures (Chuan and Messner, 2003). Ogunlana (1997), commenting on this subject has highlighted the fact that the execution of any project through a public private partnership is more prone to risk than under direct

government finance. It has already been shown that between 1984 and 2009, 35% of all partnered water projects, 6% of power projects, and 29% of combined water and power projects were either cancelled or encountered serious problems causing delays, and that poor risk management, lack of competition, poor transparency, and complex decision-making are the four main culprits in this respect (Zhang, 2005). Likewise, the evidence that multinational companies find their involvement in water and power projects is available. The Suez Company, for example, has expressed an intention to withdraw from projects in developing countries where risk is not adequately covered (Hall and Lobina, 2004), the French Saur Company is also considering its presence in developing countries, and the UK Thames Water Company (the largest privately-financed water company in the world), met tremendous problems in its work on the Yuvacik Reservoir in Turkey which cost more than double the amount originally envisaged and took much longer to deliver (Global Water Report, 2002). Poor project management, implicit in which is the management of risk, has underpinned all these difficulties and contributes towards the negative perception of the multinationals towards tendering for these large projects in developing country contexts.

Clearly, in SA, the procurement of water and power via IWPP schemes is still an unfamiliar concept, and their development remains in the early stages, yet the indications to date with only one of the four projects completed thus far having met their original budget and delivery time (WEC, 2011) are not promising. And, as mentioned earlier, the Ras Alkhair project was cancelled by the Saudi government even before it had started because of the many financial and non-financial risks identified but not covered (SWPF, 2009). Nonetheless, irrespective of this negative history, SA is currently committed to the IWPP approach for another six projects by 2016, since the need for water and power is dire, so it is essential that solutions to the problems contributing to the overwhelming lack of success so far, are found.

From the known experience of success and failure of IWPP projects, it is clear that the project lifecycle is beset with many unpredictable occurrences, which come from many different sources, and which preclude on-time, and on-budget completion. Factors such as the short history of IWPP, a lack of experience in arranging IWPP projects by the parties involved, the complexity occasioned by the involvement of various stakeholders, limited competitors, a

long negotiation and concession period, long-term financing, environmental conditions, technology issues, the complex interface between water and power, and unpredicted events, all emerge as risks to be identified and managed (Wibowo and Mohamed, 2008; Cheung and Chan, 2011).

In global terms there has been much research seeking to identify the performance level of IWPP projects and the possible reasons for their failure, and various risk factors representing major impediments to their success have been highlighted, but the performance evaluation of IWPP projects in the Saudi context remains little-researched. This is not surprising given the relative novelty of the scheme in the country, as of yet four projects are only just entering the operational phase. Hence, whilst the IWPP literature does include research efforts into the area of risk identification and allocation within IWPP projects, nothing has yet been published that provides a comprehensive and holistic theoretical or practical framework for managing risk involved with IWPP projects in SA.

It is important to note that IWPP schemes are recognised as amongst the most risky project approaches. This is borne out by previous studies that have demonstrated IWPP projects to be problematic and render poor performance, in SA and internationally. However, such studies have firmly laid the responsibility for such failure on poor risk identification, analysis and mitigation, and have suggested that by paying special attention to risk factors, industry practitioners can contribute substantially towards minimising poor performance. Part B of the chapter now discusses the management of risk and the common risk factors leading to failure in this approach.

Part B: The Management of Risk

2.5 Introduction

It is crucial to find answers to the question of why PPP projects are so risky, and hence, in this part of the chapter, some of the major sources of risk to which private infrastructure projects are exposed are illustrated. Additionally, an overview of the existing risk management model, together with risk factors related to construction, PPP, and water and power plant projects is given, and finally, the reasons for the failure of 75% of IWPP projects in SA (WEC, 2011) are examined.

In the consideration of risk, it is fair to say that there is no commonly accepted definition for the term 'risk' – neither in the sciences, nor in public understanding. Despite the differences in the definition, however, all risk concepts have one element in common, that being: 'the distinction between reality and possibility' (Markowitz, 1991; Evers and Nowotny, 1987).

If the future were either pre-determined or independent of present human activities, the term 'risk' would make no sense. This may seem obvious but only in the context of fairly recent developments in our own culture, and the idea does in fact, contrast sharply with more fatalistic views of nature and society (Renn, 2011).

Risk is a constant factor in every decision-making process made throughout life, and that pertains obviously to the design and planning decisions made within the construction industry. Whilst potentially being difficult to deal with, risk is nonetheless inherent in every human endeavour.

As such, it is important to understand the nature of risk if an informed decision is to be made, particularly in the case of IWPP projects that require different parties to work together towards a common goal, each with their own objectives. It is essential to understand factors

affecting risks if their possible gains and losses are to be evaluated and appropriate decisions on what to do about them are to be made.

2.6 An Overview of Risk Management

2.6.1 The Definition of Risk

While there are many varied definitions of risk widely available, often incorporating industry-specific terminology, as noted below, it is generally accepted that it is known for certain that something is going to happen, it has no risk attached to it. Should there be an element of uncertainty surrounding it, then risk exists. Many researchers have defined risk based on their perceptions of the needs or outcomes of their studies. Some of the definitions of risk encountered in the literatures follow:

- Wideman (1986) and Akintoye and Macleod (1997) define risk as the likelihood of unforeseen factors occurring, which would adversely affect the successful completion of a project in terms of cost, time and quality.
- Cooper and Chapman (as cited in Berechman, 2010:182) define risk as "*the exposure to the possibility of economic or financial loss or gain, physical damage or injury, or delay as a consequence of uncertainty associated with pursuing a particular course of action*". Risk to the economist focuses on the financial aspects, engineers relate risk to process disruption and cost, the military considers the risk of completing a task, police officers treat risk as threat to citizens, and employees may see risk as being dismissed from work.
- The PMBOK Guide (2004) defines project risk as an uncertain event or condition that, if it occurs, has a positive or a negative effect on at least one project objective, such as time, cost, scope or quality.
- Burke (2003:253) says of risk: "*when a risk occurs, with some entrepreneurial ingenuity, this may open up an opportunity and conversely when pursuing an opportunity there will be associated risks. Risks are generally deemed acceptable if the possible gains exceed the possible losses*".
- Risk: Webster's Seventh Collegiate Dictionary defines 'Risk' as the "possibility of loss or injury", "a dangerous element or factor", or as "the

subject, peril or hazard as defined in an insurance contract, or the degree of possibility of gain or benefit".

2.6.2 Risk Management

Risk management refers to the process of reducing the risks to a level deemed tolerable by society and to assure control, monitoring, and public communication (Morgan, 1990).

Since risk refers to the potential for 'real' consequences, it is both a social construction and a representation of reality. Thus, the concept of risk contains three elements:

- The outcomes that affect what humans value,
- The possibility of occurrence (uncertainty), and
- A formula to combine both elements (Renn et al., 1992).

According to Baker et al. (1999), formal risk management in construction has become an integral process only in the past few decades. The main reason for this is the rapid advancement of technology. Risk, and its management, have therefore, become specialised subjects in themselves in recent times, but with a lack of history in this respect, it is quite possible that many people are not aware of the benefits of risk management (RM), when applied effectively, as a project management tool.

The main objective of project management is to maintain a good balance between the three established conventional objectives of any construction project, which are cost, time, and quality.

Any occurrence that may threaten the achievement of these objectives and prevent the project manager from meeting such targets is considered a risk to the project, and it is at the point of recognising such a threat that RM must be invoked to prevent, mitigate, and reduce it in order to protect the ability to achieve the three project objectives.

2.7 Risk Management Process

Risk management involves maximising opportunity, namely increasing the probability and impact of positive events, and decreasing the probability and impact of adverse events.

Flanagan and Norman (1993), and Raftery (1994) define RM as a process comprising the following main steps:

- Risk Planning – making the decision on how to approach, plan, and execute the RM activities for a project;
- Identification - determining which risks might affect the project and documenting their characteristics;
- Risk Analysis – prioritising risks for subsequent further analysis or action by assessing and combining their probability of occurrence and impact;
- Risk Response - planning: developing options and actions to enhance opportunities and to reduce threats to project objectives;
- Risk Monitoring and Risk Communication - tracking identified risks, monitoring residual risks, identifying new risks, executing risk response plans, and evaluating their effectiveness throughout the project life cycle

Dey (1999) on the other hand, suggests that project RM processes are threefold, and involve:

- identifying risk factors;
- analysing their effect; and
- responding to risk.

Chinyio and Fergusson (2003) assert that RM should be approached as an iterative process, and not in isolation in the discrete phases of identification, evaluation, and control. They argue that the identification of risks should be followed by a search for solutions that can ameliorate or eliminate these risks, an assertion which builds on the ideas of Flanagan and Norman (1993) and Raftery (1994), who believed the main focus in the process should be on risk monitoring and communication as this eventually brings solutions to problems of risk.

Effective project RM can be seen as a formal and orderly process of systematically identifying, analysing, and responding to risks throughout the lifecycle of a project in order to obtain the optimum degree of risk elimination, mitigation, and/or control. Kezsbom and Edward (2001) considered RM to be an important and integral element of project management. However, whilst all managers (and indeed all human beings) manage risk either consciously or unconsciously, this is rarely done on a systematic basis. The management of risk is a forward-thinking act in which individuals or groups consider the future of a particular process and endeavour to identify, in a responsible manner, the advantages and disadvantages of particular actions or inactions. This enables the achievement of balanced thinking, which in itself provides a framework to facilitate more effective decision-making.

Risk management may also address financial or legal implications, operational or compliance risks, as well as risks that may affect the strategy of the organisation as whole.

For the purposes of this study, RM relates to the construction industry in general and to the IWPP strategy in particular. In the construction project management context, RM is a comprehensive and systematic way of identifying, analysing, and responding to risks to achieve project objectives (PMBOK, 2008). It has the following main benefits:

- identifying and analysing risks;
- improving project management processes; and
- making effective use of resources.

As an example of project-based RM in its simplest form, and after consideration of attitudes towards risk as well as the risk tolerance of the organisation, managers evaluate project risks through the statement of work (SOW), and examine the work breakdown structure (WBS) for the project in order to pinpoint the sources of risks. The use of the SOW and WBS to assess the roles and responsibilities of the individuals to be involved in risk planning enables a thorough evaluation of the separate risks associated with sub-tasks to be conducted (Dey et al., 1994). In this respect, a good RMP gives a brief summary of the approach, tools, and data sources that are to be used to allow effective RM of a project. It should also define the roles of the RM team members (for every activity in the RM process) along with their responsibilities.

Additionally, it should assign resources and contain estimates of the costs needed for RM, and define when and how often the RM process will be performed throughout the project lifecycle.

Finally, the RM process provides a structure to ensure a comprehensive process of systematic risk identification to a consistent level of detail, and contributes to the effectiveness and quality of risk identification, which is the next process in RM. Project team members must hold a planning meeting to enable them to develop the RM process, and in practice such meeting is usually attended by the project manager and selected project team members, depending on the complexity of the project, and by other stakeholders, namely anyone in the organisation responsible for managing risk planning and execution.

2.8 Risk Management Standards, Frameworks, and Models

It is vital for both the public and private sector organisations involved in PPP to understand the various risks associated with projects throughout the complete project lifecycle, in order to guarantee enduring success. Additionally, it is necessary to address the likelihood of each and every risk, and the organisation's ability to reduce the incidence and impact of each one (Brown, 2000). However, the lack of a formalised RM framework through which to conduct these activities represents one of the main barriers to project success (Tah and Carr, 2000), and hence, it is useful to develop a framework within which RM can be understood in broad terms.

Generally, a framework is considered as "a set of ideas, rules, or beliefs from which something is developed, or on which decisions are based" (Longman, 2012). A model, on the other hand, can be described as an object or phenomenon that shares important characteristics with the object or phenomenon, and which allows a complex system to be understood and behaviour within that system to be predicted, by simplifying detail (Longman, 2012). Specifically in terms of a risk management framework (RMF), this can be described as a particular set of functional activities and associated definitions that specify the processes that

will be used to manage risks (and their order and timing) in any given organisation (Shortreed et al., 2003).

In the extant literature, different names are given by researchers to describe the same thing. For example, the names given for the AS/NZS 4360 RM, PMBOK, MOR, and PRAM are standard (IRM, 2002; PMBOK, 2004; Standard Australia, 1995, 1999; Dalgleish and Cooper, 2005; Shortreed et al., 2003), but some researchers refer to these as frameworks or models (Dalgleish and Cooper, 2005; Shortreed et al., 2003; Sinclair and Rizak, 2002), whilst others call them processes or approaches (Dalgleish and Cooper, 2005; Shortreed et al., 2003; Jafari et al., 2011), and indeed as seen from the references given, some actually use all of these terms interchangeably. However, for the purposes of the current study, the researcher has chosen to use the term 'model', bearing in mind the definition given above (a description of an object or phenomenon that shares important characteristics with the object or phenomenon and which allows a complex system to be understood and behaviour within that system to be predicted, by simplifying detail. This is accepted as the description for work undertaken by the researcher since the intention is to devise an organised procedure for the effective management of risks in IWPP projects in Saudi Arabia (SA). Indeed, a major objective (as stated in Section 1.3.2) is to develop a model which reflects critical elements leading to the ineffective implementation of RM in IWPP projects in SA.

The advantage of developing such a model is that it would allow for the resolution of various RM problems (Cooper et al., 1985; Perry and Hayes, 1985), as all potential problem sources, and reactions to them, could be identified through it. Such a model would reflect the reality of staff risk-awareness, measure risk consistently (events, consequences and respective risk), and show how to manage and communicate risk (existing and proposed controls, responsibilities, and reporting) more effectively, using a common language (Dalgleish and Cooper, 2005). Table 2.1 presents an overview of RM frameworks/standards/models.

Author/s	Study	Finding	Remarks
Standards Australia/Standards New Zealand, 1999	Risk Management. Australian/New Zealand Standard	AS/NZS 4360 Risk Management	-The first consensus national standard on risk management issued in 1995 and revised in 1999 - This standard proposed a system of RM and control - Consists of 6 steps starting from context to monitoring.
PMBOK, 2004	PMBOK	Project Management Body of Knowledge Standard	- Consists of 6 steps: planning, risk identification, qualitative analysis, quantitative analysis, response to risk, and monitoring
PRAM	PRAM	Project Risk Analysis and Management Standard	- Similar to AS/NZS 4360 RM, PMBOK and MOR - Consists of 6 steps
MOR	MOR	Management of Risk Standard	Similar to AS/NZS 4360 RM, PMBOK and PRAM - Consists of 8 steps
AIRMIC, ALARM, IRM, 2002	A Risk Management Standard.	AIRMIC, ALARM, IRM: A RM Standard.	- A joint venture by IRM, ALARM, and AIRMIC - It is an arrangement of processes in a linear sequence, but with opportunity for feedback - Similar to the AS/NZS 4360 standard. - It uses a 'matrix' method
Canadian Standards Association.	Risk Management: Guideline for	The Canadian Risk Management	- It is a generic standard -This standard was a milestone and the AS/NZS 4360 standard issued in 1995 was revised in 1999 to incorporate some of its ideas

1997	Decision-Makers	Standard Q850	- Emphasis on decision-making, stakeholders, risk evaluation, risk communication
The US Presidential Congressional, 1997	Health Canada decision-making framework for identifying, assessing, and Managing health Risks	U.S. Presidential/ Congressional Framework for Environmental Health Risk Management	- For Environmental RM and focused on health outcomes - Emphasises the role of Stakeholders, similar to the Canadian standard - A conceptual framework which needs to be operationalised by a specific organization
Japanese Standards Association, 2001	JIS Q 2001: Guidelines for development and implementation of risk management system	JSI Q 2001:2001 – Guidelines for development and implementation of risk management system	- There are two basic advances in the standard, the first is the formal definition and development of the RM system & the second advance is the linkage of the RM system directly to TQM
British Standards Institution, 2000	British Standard Project Management	BSI Technical Committee: Guide to the management of business related project risk	- Similar to AS/NZS 4360 standard - It is a generic 'business' standard and is fully compatible with the NERAM benchmark standard
Royal Society of Canada, 2001	Review the Socio-Economic Models and Related Components	Integrated Risk Management Framework	- Provides generic guidance for RMF in a variety of government agencies and ministries - Consists of 9 steps
Sinclair, M, and Rizak, S, 2002	Drinking Water Quality Management: The Australian Framework	The Risk Management framework for water supply	- This framework has developed for water supply systems and it integrates quality and risk management principles - The framework is a risk management framework in a Quality Management format

		systems	
Bhattacharyya and Dey, 2007	Managing risk in large rural electrification programme in India	A hierarchical RMF for effectively managing large-scale development projects	- Limited to manage risk in large rural electrification. - Classified risks into three levels: government, state, and site level.
Dalgleish and Cooper, 2005	RM: developing a framework for a water authority	Developed a RMF with accordance of AS/NZS 4360,RM	- Specified to public sector. - Developed a strategy for implementing a RMF. - Applied the AS/NZS 4360 RM.
Wang et al., 2004	RMF for construction projects in developing countries	A risk model, named Alien Eyes' Risk Model	- Deal with only general construction risk factors. - Focused on the influence relationship among risks. - Survey sample targeted project sponsors, developers, investors, and contractors but was very small sample.
Dey and Ogunlana, 2004	Selection and application of RM tools and techniques for BOT projects	A systematic model for selecting RM processes for BOT projects	- The model was developed mainly based on the reviewed studies. - Deals with general risk factors related to BOT projects.
Zou et al., 2008	A life-cycle RMF for PPP infrastructure projects	Risk allocation framework for PPP projects	- Associated with general PPP infrastructure projects. - Shows the dynamic process for allocating and monitoring risks. - Gathered risks from three PPP projects in Australia and China.
	Framework for Managing Risk in	Framework for	- Limited to PPP market projects within the south-western zone of

Awodele, 2012	Privately Financed Market Projects in Nigeria	Managing risk in privately-financed project	the Nigeria. - Risk factors related to privately-financed market projects. - Small number of respondents

Table 2.1: Overview of RM Standards/Frameworks/Models

Some of these models/frameworks incorporate a general process that does not specify the sector, whereas others, such as that of Awodele (2012), considering Market projects in Nigeria, are designed specifically with an industrial context in mind. In fact, it is essential to specify the sector when developing such a model, yet to the best of the researcher's knowledge, no previous study has established a model to link RM to the water and power sectors, when private sector participation is involved, although a generalised risk model/framework does exist.

2.9 Risk Factors

According to the PMBOK (2008), risks are categorised into such groups as:

- technical,
- external,
- organisational,
- environmental, and
- project management.

Some categories of risk affecting a construction project are similar to risks for other investment projects, whether it be an investment in common stocks or government bonds, and some are specific to construction. The risk identification process should highlight those risks that may be considered by project management to be more significant and to require further analysis (Adams, 2008). Risk identification is an iterative process because new risks may become known as the project progresses through its lifecycle, and previously-identified risks may disappear (2007).

Construction projects carry complex risks for all stakeholders - owners, consultants, contractors, and suppliers - and such risks can increase when construction takes place near an active facility or congested area. Risks include geological or pollution-related conditions, interference with ongoing operations, construction accidents, as well as design and construction faults that may negatively impact upon the project during construction and when the project is complete.

The Project Manager (PM) is ultimately responsible for the planning and management of the process at this level, although s/he may divest primary responsibility to a competent deputy such as the Commercial Manager or a dedicated Risk Manager. If the risk manager is not working full- time on the project, a competent, full-time member of staff must be nominated to take ownership of the Risk Management Plan.

The identification of risk factors constitutes the first stage in RM and can be considered as a keystone (El-Amm, 2003). Clearly, this is an important element of the process, however, the intention of this research has not solely been to generate a list of risks, but also to identify the key risks that could significantly influence the delivery of IWPP projects in SA.

Over the years, many researchers have identified risk factors that affect projects in different countries (Wibowo and Mohamed, 2008; Chiu and Bosher, 2005; Cheung and Chan, 2011; Yang et al., 2010; Ke et al., 2010; Tang et al., 2007; Wolfs and Woodroffe, 2002; Bhattacharyya and Dey, 2007; Zou et al., 2008; Wang et al., 2004, Li et al., 2005; Zhang, 2005; and Awodele, 2012). Silk and Black (2000) concentrated on the identification and management of risk in China, and also in China, Wang et al. (2004) identified and evaluated the unique and critical risks associated with BOT projects. Li et al. (2005) explored the allocation of risk in PPP/PFI construction projects in the UK, while Thomas et al. (2006) assessed critical risks in BOT road projects in India. Again in the Chinese construction industry, Tang et al. (2007) identified 32 risk factors inherent to that context, and in Africa, Awodele (2012) identified 68 risk factors associated with privately-financed market projects in Nigeria. The most relevant study to the current was is that of Wibowo and Mohamed in 2008, since this identified 39 risk factors inherent to water supply PPP projects in Indonesia,

gathered through a literature review. However, their study did not consider both the water and power sectors, and consequently it is unable to offer a practical perspective on the situation in the Saudi industry. It is clear from a consideration of these studies that they focus on construction and PPP infrastructure generally and have no specific emphasis on particular projects, such as IWPP projects.

According to Wang et al. (2004), the non-availability of previous data based on similar projects often leads to inadequate identification of important risk factors. This presents a difficulty for the current research since a review of the extant literature shows a distinct lack of information in this connection within the SA context. Moreover, the research generally on IWPP is not abundant, and hence it is not sensible to attempt to generalise from other industries, since the risk factors differ in their level of importance depending upon the industrial context (Wang et al., 2004). Such situation calls for a study of RM in IWPP projects.

From an extensive review of the related literature, a total of 89 risk factors (Table 2.2) are revealed, which it is crucial to re-examine in order to determine which of those factors is applicable to IWPP arrangements in general, and to IWPP projects specifically in Saudi Arabia. Figure 2.3 provides a diagrammatic representation of how these risk factors can be categorised, and Table 2.2 presents a complete list of the 89 factors.

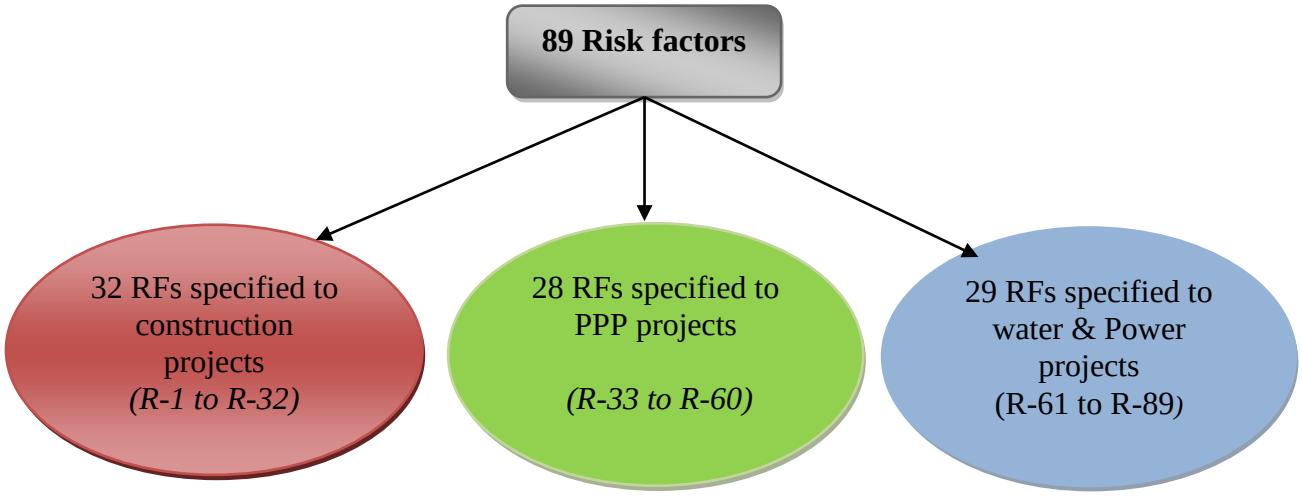


Figure 2.3: Breakdown of the Risk Factors Identified in the Literature

Risk category	Risk Factor	Risk category	Risk Factor
R-1	Inadequate site information	R-46	Poor relationship with government authority
R-2	Adverse weather conditions	R-47	Lack of government support
R-3	Acts of God (Force majeure)	R-48	Improper selection of designers
R-4	Unstable political situation	R-49	Improper selection of contractors
R-5	Influential economic events(boom/recession)	R-50	Improper selection of suppliers
R-6	Third party tort liability	R-51	Long term finance
R-7	Third party delay	R-52	High bidding cost
R-8	Improper planning	R-53	Lack of government guarantees
R-9	Improper scheduling	R-54	Lack of partnering skills
R-10	Poor definition of scope	R-55	High interest rate
R-11	Design deficiency	R-56	Inadequate disruptions of authority between partners
R-12	Deficiencies in specifications	R-57	Organisation and coordination risk
R-13	Incompetence contractor	R-58	Poor public decisions making process
R-14	Poor competency of laborers	R-59	Excessive contract variation
R-15	Construction time overrun	R-60	Delay in start-up of the project
R-16	Construction cost overrun	R-61	Environmental hazards of the project
R-17	sub-contractors poor performance	R-62	Industrial regulation changes
R-18	Supplier poor performance	R-63	Poor laborers productivity
R-19	Late design change	R-64	Poor equipment productivity
R-20	Cost of legal process	R-65	Equipment and material availability
R-21	Poor coordination with sub-contractors	R-66	Inadequate experience of IWPP
R-22	Length process of change orders	R-67	Import restriction (logistics)
R-23	Failed examination and inspections	R-68	Unproven engineering techniques
R-24	Design variations	R-69	Technical risks
R-25	Availability of finance	R-70	Demand risk
R-26	Improper quality of sub-contractor work	R-71	Operation & maintenance cost overrun
R-27	Manpower problems	R-72	Limited competitors
R-28	Corruption	R-73	Unavailability of long-term supply of fuel
R-29	Length of legal process	R-74	Site access difficulties
R-30	Change government regulations	R-75	High capital cost
R-31	Inflation	R-76	Maintenance cost higher than expected
R-32	General safety accident occurrence	R-77	Maintenance more frequent than expected
R-33	Length of tendering stage	R-78	Tracking new technology (latest &best)
R-34	Delays in project approvals and permits	R-79	Insufficient profitability of the project
R-35	Delayed payment on contract	R-80	Deterioration and depreciation of asset
R-36	Delays in fund allocation	R-81	Supply and demand balance
R-37	Occurrence of dispute	R-82	Raw water quality and quantity
R-38	Inadequate disruptions of responsibilities	R-83	Life of facilities shorter than anticipated
R-39	Different working method/Know-How between partners	R-84	Interface between water and power (non-availability of one of them)
R-40	Operational revenue below expectations	R-85	Lack of qualified bidders
R-41	Lack of commitment from either partner	R-86	Unexpected increased demand
R-42	Inappropriate risk allocation	R-87	Shortage of operation manpower
R-43	Lack of coordination between parties	R-88	Obsolete or inappropriate technology
R-44	Cultural differences between main stakeholders	R-89	Transportation difficulties of heavy equipment
R-45	Improper project management		

Table 2.2: Risk Factors Identified in the Literature

2.10 Risk in Construction

Construction projects are always unique and risks arise from a number of different sources (Oyegoke, 2006; and Pheng, 2006). Such projects are inherently complex and dynamic, they involve multiple feedback processes (Sterman, 1992; and Uher, 2004), as a great many participants (individuals and organisations) are actively involved in them; naturally, their interests may be positively or negatively affected as a result of the project execution or project completion (PMBOK, 2008). Different participants with varying experience and skills usually have different expectations and interests (Dey and Ogunlana, 2004), which can create problems and confusion for even the most experienced project managers and contractors.

As noted by Hayes et al. (1986), the construction industry is one of the most dynamic, risky and challenging businesses. This is evidenced in the number of major projects that fail to meet their delivery deadlines and target costs. Consequently, the industry has earned itself a very poor reputation for managing risk.

According to Akintoye and MacLeod (1997), construction risk is generally perceived as events that influence the project objectives of cost, time, and quality. Analysis and management of risk in construction depend mainly on intuition, judgment, and experience. Because of the lack of knowledge and doubt about the suitability of risk analysis procedures, formal and systematic risk analysis and management procedures are rarely used in the construction industry. Indeed, Bing et al. (1999) state that a systematic approach to RM is not a widespread practice in the construction sector because of the complex nature and involvement of many parties, seen in construction projects.

For a project to be regarded as successful, it should be delivered on time, within the specified budget, and to the requisite performance standards as detailed in the original technical requirements. Such criteria may be difficult to achieve, however, since changes in the project environment are frequent occurrences, and these are identified as the main barriers to success. Moreover, the problems tend to increase in line with the size of the project, as the greater the project, the greater the scope for uncertainties (Routledge, 2011).

Such uncertainties surround large construction projects because of a number of factors, these being:

- planning,
- design and construction complexity,
- the presence of various interest groups (owner, consultants, contractors, suppliers, etc.), and the availability of resources (manpower, materials, equipment, and funds),
- environmental factors,
- the economic and political environment, and
- statutory regulations.

Hence, there is great potential for construction projects to be extremely unpredictable. Consequently, the management of risks in such projects has been recognised as a very important process in the effort to achieve project objectives in terms of time, cost, quality, safety, and environmental sustainability (Zou et al., 2007). Project risk management is an iterative process; the process is beneficial when is implemented in a systematic manner throughout the lifecycle of a construction project, from the planning stage to completion.

2.11 Risk in IWPP Projects

As briefly explained in the previous sections, IWPP projects are more risk-intensive in the areas of finance, completion, operation, market, political and environment. Some risks faced by this kind of project are unique to this sector but can be challenging in any industry (Wolfs and Woodroffe, 2002).

According to Thomas et al. (2006), IWPP projects are regarded as particularly risky as a consequence of the following features:

- They require multiple, complex interdependent agreements between multiple private and public sector parties;
- They have a long lifecycle;

- They require huge investment with high upfront costs;
- They have a long payback period;
- They require considerable effort in the developmental stages due to their complex structure and process;
- They are susceptible to political and economic risk and involve a complex contract mechanism involving many participants with diverging interests, which can impose limitations on the project

It is important to manage the multifaceted risks associated with water and power projects with regards to private sector participation. Water and power plant projects created through the IWPP mechanism have typically involved a plethora of risks because they have simply been a long-term arrangement to transfer project risks traditionally borne by the government, to the private sector. Effective RM implementation is, therefore, key to the success of any public and private project (Wibowo and Mohamed, 2008). And IWPP projects demand even more effective RM due to their large scale, their long concession periods, complexity and social sensitivity usually associated with them (Grimsey and Lewis, 2002). These characteristics could make IWPP projects vulnerable to a plethora of risks which, if not managed appropriate, could result in substantial cost escalation and time overruns.

Chinyio and Fergusson (2003) identified some difficulties that practitioners usually encounter in risk analysis and management, as being:

- absence of a risk management culture;
- lack of certainty in the efficacy of risk assessments;
- inadequate historic data to support risk assessment;
- recourse to subjective assessments rather than the use of objective measures due to a dearth of data;
- differing perceptions on the magnitude of risks;
- lack of commitment and a clear strategy from the client;
- lack of requisite expertise;
- the long duration of some project schemes such as IWPP;
- late start to the risk management exercise;

- the dynamic nature of some project (IWPP) risks;
- unstructured nature of risk assessment;

Part C of the chapter now considers the role of national culture on the behaviour of individuals in the workplace.

Part C: The Saudi Culture

2.12 The Saudi Culture

Having explored the literature concerning IWPP projects, and the issue of RM within that particular context, it is important to overlay another consideration upon both these phenomena, that being the way in which their operation may be affected by the culture of the country in which such projects are being constructed. In this respect, it is important to grasp the meaning of culture, which Kluckhohn (as cited in Hofstede, 2001:9) says consists of "*patterned ways of thinking, feeling and reacting, acquired and transmitted mainly by symbols, constituting the distinctive achievements of human groups, including their embodiments in artefacts*".

Ideas about national characteristics can be traced back through the centuries to Julius Caesar in 50 BC, Ibn Khaldun, who in the 14th century, recognised the phenomenon of 'mental programming', and to the raft of European philosophers in the 18th century, including Hume, Montesquieu, and Kant (Hofstede, 2001). Such ideas have been a continuing matter for thought and discussion, such that in more modern times, Inkeles and Levinson (1969) reviewed the abounding literature and found three major characteristics of culture to be: the individual's relationship to authority, the concept of self, and the way of handling primary dilemmas. Within the concept of self, Inkeles and Levinson (1969) identified considerations such as the individual's conception of masculinity and feminity, and individuality and society (Hofstede, 2001). The argument in this respect was that depending upon the attitudes and values held by people, their actions would differ.

Hofstede's work on national culture expands this typology, and given the wide reach of his study which involved 53 countries and regions, is considered as the most comprehensive study of its kind (Harzing and Ruysseveldt 1995). According to Hofstede, after his work with IBM employees around the world, it was possible to conclude four very specific dimensions of culture that were present in all countries, these being: power distance, uncertainty avoidance, individualism versus collectivism, and masculinity versus femininity. A fifth dimension was later added by Hofstede after working with Bond (Hofstede and Bond 1988)

which reflected persistence, endurance, and a general orientation to time. This characteristic had been seen in the Far East and was entitled Confucian dynamism.

Power distance concerns the degree to which members of a society accept inequalities in that society, and legitimise power that is not equally shared. This is manifested in organisations by extremely hierarchical structures with clear lines of command control that determine who is superior/subordinate to whom, and regulate behaviour through the presence of communication protocols. Hofstede found large power distance rankings for the Arab countries (Egypt, Iraq, Kuwait, Lebanon, Libya, Saudi Arabia, and the UAE), suggesting that individuals in these cultures did not step out of their formal job role.

Uncertainty avoidance concerns the way in which conflicts are managed and reflects whether a society can tolerate uncertainty and ambiguity. In societies where there is a reticence to accept uncertainty, rules and regulations abound giving clear direction as to how to proceed in all walks of life (work and social), and from this stems the characteristic that it is difficult to accept change. From an organisational viewpoint, high uncertainty avoidance stifles initiative among a workforce because the rules are limiting, and penalties follow their breach. Individuals want the status quo to be maintained. Again, Hofstede found large uncertainty avoidance rankings on this index for the Arab countries.

Individualism versus collectivism is concerned with the relationship between the individual and society at large, and is a reflection of the extent to which a person acts individually without reference to the wishes of his/her wider peer group, family, and circle of friends, or behaves as a member of a collective – a group such as a family, clan, or tribe. In a collectivist society, individuals use the wider group to which they belong as a reference point for all daily activities, they feel obligated to maintain harmonious relations with others from the same group and sustain those relationships by co-operation, and providing favours which can be returned at some point in the future. Once again, the Arab countries scored high on this ranking, suggesting allegiance to extended kin and friends, rather than to an organisation.

Masculinity versus femininity is a dimension that refers to the degree that a society's dominant values stress masculine social values like hard work to earn money, recognition and achievement, as opposed to feminine social values that have their emphasis on the quality of life and caring for others. On this index the Arab countries were more measured, gaining a score of 53 thereby revealing that both dimensions are important to their societies, and suggesting that the Islamic values underpinning the traditions of those cultures were evident in national qualities such as a good work ethic (masculinity) and generosity in caring for others and charitable work (femininity).

This framework for interpreting human behaviour in different nations has implications for the way a society views risk, and hence for risk management, for the way in which a society communicates with those within and outside that society, and for many other work-based behaviours. Consequently, it may of use in interpreting some of the findings from this study.

2.13 Summary and Literature Gap

The chapter has reviewed the existing literature and highlighted its usefulness and contribution to the current research study in its focus on RM in IWPP. It began by providing an overview of water and power plants and clarified the issues relating to IWPP arrangements, detailing the process, structure, advantages, and disadvantages, and finally, the performance of these projects. In the second part of the chapter, the concept of RM has been explored in some depth. Definitions have been offered, and a comprehensive summary of the current standards, models and frameworks of RM have been illustrated. Finally, the type of risks encountered in construction, and IWPP projects, have been identified and explained. It was seen that the literature argues that risk is inherited in IWPP projects and that the successful management of risk is crucial to a product's success.

In the precise context of SA, there has been no successful application of RM throughout the diverse stages of construction projects (Falqi, 2004). Moreover, the literature contains no reports of feasibility studies to assess the practice of RM in water and power projects in SA, and there has been no empirical work whatsoever in this exact setting. The work that has been

conducted to examine the risk in general in water and power plant projects has demonstrated the complexity of these undertakings. Given the particularities of the Saudi environment, it can be assumed that such complexity is increased. The shortcomings in the literature, and the knowledge of the complex nature of IWPP projects, combined with an appreciation of the fact that RM is implemented on an informal basis in Saudi Arabian construction projects, create an urgent need for an investigation into RM practice in IWPP projects in SA.

Such investigation is even more timely, since it is accepted that not all projects can easily implement RM, and water and power projects, especially IWPP projects, are known to find this a challenge, yet the reasons are not entirely clear. It is true that many researchers have developed general models for PPP infrastructure and construction projects, but to the best of the researcher's knowledge, there is no a specified model pertaining to IWPP projects in either developed or developing countries. For this reason, and based on the researcher's interest in the area of RM and IWPP, and the fact that the water and power industries are in desperate need of such related research, this study is conducted with the firm belief that it will contribute to knowledge by formulating an organised procedure for the effective management of risks in IWPP projects in Saudi Arabia.

In the final part of the chapter, attention has been given to the concept of culture, and ideas about national culture. Essentially the work of Hofstede has been considered as the basis upon which the Saudi Arabian culture can be explained, in the expectation that attitudes towards risk, and certain of the problems encountered in the management of IWPP projects might be attributable to cultural traits.

The methodology adopted to achieve this aim is detailed in the following chapter.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

Having explored the theoretical background to the study, the thesis proceeds with this chapter, to present a comprehensive explanation of the methodology used to achieve its stated aim and objectives. The chapter begins with a consideration of research paradigms and philosophical approaches, grounded theory approach and progresses to consider the principles of various research strategies, processes, and the various types of data collection methods. Potential ways to analyse data are also discussed. Having presented this general overview of how research can be conducted, the chapter then focuses on the particular choices made for this study, highlighting the methodology, data gathering, data analysis techniques adopted.

Part A: Research Approach

3.2 The Research Paradigm and Philosophy

The underlying perspective held by a researcher when conducting any study is referred to as the research paradigm and within this is embedded a particular philosophy. This is an extremely important aspect of the entire subject of research methodology, since only when this is established can the researcher decide the most effective and appropriate way of collective data. According to Johnson and Christensen (2005), the research paradigm is a perspective that is based on a set of shared assumptions, values, concepts and practices. It is a reflection of how a researcher thinks about the development of knowledge before s/he embarks upon a study. Essentially, this emerges from the way the researcher relates to the world around him/her and the purpose of the study s/he wishes to undertake.

Smith et al. (1991) stress the importance of researchers having a sound understanding of their philosophical stance in this respect, since such understanding will enable them to

appreciate what potential research designs and methods might be useful to them, and clarifying which of all of these will be the most likely to help in achieving their aims and objectives. Furthermore, by reviewing their personal research philosophy, researchers can increase their knowledge of how best to conduct the research process and this can result in greater confidence in the methodology eventually chosen (Holden and Lynch, 2004). Consequently, it is valuable for this study to discuss the main philosophical approaches, and in this respect, it is noted by McNabb (2007), that three potential options exist, these being: *positivism*, *interpretivism* and *realism* as paradigms for performing a study.

3.2.1 Positivism

Saunders (2003) reviews the positivist approach, summarising the characteristics as follows:

- It is a highly structured methodology that enables generalisation and quantifiable observations that are evaluated through the use of statistical methods.
- It is a critical and objective approach commonly used in natural science.
- It is based on various laws of natural science, such as the philosophy of unchanging, universal law, and the view that everything occurs in nature.
- It prompts researchers to obtain facts and figures that are associated with the research issue through general sources.
- It places the researcher in the role of objective analyst of the data gathered, such that the research aims and objectives are met.

3.2.2 Interpretivism

In discussing interpretivism, Saunders (2003), summarises the characteristics as follows:

- It considers the social world of management and business as too complex to be formulated in theories and laws such as is possible in natural science.

- It embodies critical thinking, which accepts that many truths and meanings can be attached to a simple fact, and that these may vary from one situation to another, and according to the research problem (Johnson and Christensen, 2010).
- It produces an end result from the collected data without the use of statistical methods but by relying on the researcher's ability to interpret the information obtained.
- It accepts the researcher's role in interacting with the environment and in seeing to make sense of that through his/her subjective interpretation of events.
- It accepts the roles played by variables in the research situation (living standards, social, cultural, and political environment, and personality and the impacts these factors have on the research process.

3.2.3 Realism

And in respect of realism, Saunders (2003) notes:

- It is based on the interdependency *(extent of mutual dependence)* of human values and beliefs.
- It focuses on the beliefs that really exist in the environment.
- It believes in the existence of external and objective reality that influences people's social interpretations and behaviour, and considers that humans are not the objects for the study as is the case in natural science.
- It defines how an individual reacts towards a real world situation (Johnson and Christensen, 2010).

Clearly, these three major philosophies steer researchers in different directions, and hence it is imperative for researchers to fully appreciate their philosophical positions before they can properly choose the designs and methods to enable them to execute their studies such that they meet their aims and objectives (Smith et al., 1991).

The opposing research philosophies of positivism and interpretivism generate differing methodologies, these being generally apparent in the type of data collected. Respectively, qualitative and quantitative methodologies are derived from these opposing stances.

In their discussion of research paradigms, Sale et al. (2002), highlighted the set of assumptions that each one assumes. These relate essentially to assumptions about reality, about the knowledge of that reality, and about the particular ways of knowing that reality. In turn, these are known as ontological, epistemological, and methodological assumptions, as shown:

- Reality (*ontology*),
- Knowledge of that reality (*epistemology*), and
- The particular ways of knowing that reality (*methodology*).

Sale et al. (2002) concluded that depending upon which of these assumptions researchers hold, they study different phenomena.

On the other hand, many scholars do not subscribe to the idea that research must be conducted in just one of the main traditions, and that good research design, data collection, and analysis are actually derived from a combination of the appropriate elements and techniques from across the traditions and epistemological perspectives. Their view is that theoretical or philosophical foundation provides a framework for inquiry, and believe that what is truly important is the means of data collection and analysis, and the outcomes of those processes. Agar (1996:13) believes, in this connection that: "*We need a way to argue what we know, based on the process by which we came to know it*".

In fact, the positions taken by individual researchers vary considerably, and as well as those whose views of the world lead them to perceive two strategies of positivism and

interpretive as entirely separate, there are many who are happy to mix these strategies within their research projects.

That said, those who tend to prefer positivist approaches, also choose the quantitative research paradigm. In this connection, Sale et al. (2002) note that the ontological position holds that there is only truth, an objective reality that exists independent of human perception; consequently, knowledge of that reality can be investigated separately because researchers and respondents are two separate entities. The ultimate goal of the positivist paradigm is to measure and analyse the casual relationships between variables using a value-free framework (Denzin and Lincoln 1994), and that measurement implies numerical treatment. Moreover, in quantitative research, the sample sizes are much larger than those involved in qualitative research, and therefore, statistical methods are usually adopted to ensure that samples are representative, and that fine differences in opinion can be identified.

The qualitative paradigm on the other hand is based on interpretivism, and uses naturalistic approaches to inductively and holistically understand human experiences in context-specific settings (Amaratunga, 2000). It is suitable when the aim of the research is to seek the meaning of phenomena from the participants' viewpoints, which is one of the aims of the current research. Creswell (2003:22) comments in this connection that: "*if a concept or phenomenon needs to be understood because little research has been done on it, then it merits a qualitative research*".

The ontological assumptions (i.e. assumptions underpinning the view of what exists) are simply that many different truths can be found because of the different construction and perception of reality which the individual or group being investigated hold (Sale et al., 2002). If it is believed that reality is socially-constructed, as qualitative researchers suppose, then that reality must logically be constantly changing (Berger and Luckman, 1996). Consequently, the emphasis in qualitative research is on process and meanings, and the techniques used are in-depth interviewing of individuals and focus groups, and participant observation.

Sample sizes are small and not meant to represent large populations. Small, purposeful samples of articulate individuals are used because of their ability to provide important information, and not because their opinions are believed to be representative of a larger group (Reid, 1996). In a smaller number of samples, it is possible to explore ideas in detail, to gain more illuminating data, with the aim of achieving depth of understanding rather than breadth (Blaxter et al., 2000).

3.3 Grounded Theory Approach

Grounded theory is a qualitative methodology, described as an inductive research method, formally developed by Barney Glaser and Anselm Strauss in 1967 in their book entitled 'Discovery of Grounded Theory'. The method derives its name from the fact that theory is developed from the data (it is grounded), rather than the other way round.

Glaser and Strauss (1967:1) defined grounded theory as an approach that "*sought to discover theory from data through the general method of constant comparative analysis of data emerging from the field*". Jacob (1987:10) defined ethnography in sociological-type studies as being concerned with "*the description and analysis of all or part of a culture or community by describing the practices and beliefs of the group being studied and showing how the various parts of the process contributed to the cognitive map of the culture under investigation*".

According to the original authors, the grounded theory research process requires the joint collection, coding, and analysis of data as its underlying operation. Glaser and Strauss (1967:1) advanced the view that a "*systematic approach to the generation of data, which was complemented by a naturalistic approach*" could be considered to be capable of developing a theory that was 'grounded' in its nature. Strauss and Corbin (1990:23) later explained the grounded theory as one that was "*inductively derived from the study of the phenomenon that it represented, and that it was discovered, developed and provisionally verified through systematic collection and analysis of data from the field that pertained to that problem*".

Grounded Theory provides an understanding of how complex phenomena occur, where the resulting concepts are grounded in the actual reality of the phenomena themselves. Thus, the data is able to drive the final shape of the theory, and so is likely to be a good fit with the situation being researched. To this end, Corbin and Strauss (1990) suggest that researchers should gather field data and identify theory through use of a hierarchical structure of categories. And Walker and Avant (2005) state that theory generation provides a systematic view of a phenomenon.

Grounded theory also relies on the use of data display to graphically represent theory as it evolves during the course of a study (Clark, 2005 and 2009; Charmaz, 2006). Corbin and Strauss (2008:52) describe the importance of grounding abstract concepts in the lower level concepts identified during data collection, saying: "If the conceptual pyramid is carefully crafted, the higher level concepts will rest on a solid foundation of lower level concepts, which in turn go directly back to the data, bringing with them the detail and power of description".

The purpose of theory is to explain, predict, and understand phenomena and, in many cases, to challenge and extend existing knowledge. The strength of a theory lies in its explanatory power, its ability to describe patterns, and the capacity to fit different contexts. Consequently, theory is frequently produced to explain phenomena where often little understanding of the phenomena already exists.

Tables, figures, graphs and frameworks are tools that can support the presentation of theory in a research study. These tools introduce and describe the theory, explaining why the research area being studied exists, and enabling an understanding of a certain aspect or issue within the subject matter under investigation. Many researchers rely on the tables and figures, which are provided to help summarise and present data (Miles and Huberman, 1984; Eisenhardt, 1989; Eisenhardt and Graebner, 2007).

As the variables in this study are largely unknown because of the absence of related research, and the general dearth of information on the topic of RM in water and power projects, there is

a need for the researcher to focus on the context since this undoubtedly shapes the understanding of RM implementation in Saudi Arabia's water and power projects. The main task for the researcher, therefore, is to discover as much as possible about the specific issue being investigated so that the ineffectiveness of RM in IWPP projects in SA can be highlighted and addressed.

With this discovery, emergent theory will be forthcoming, and this will be presented diagramatically. Within the diagram, a series of boxes and arrows will indicate the components of the process and the inter-relationships, and an explanation using supporting data from practitioners and the literature, where possible, provided. This effort in itself will outline the underlying theoretical arguments providing the logical links between propositions.

The study's key informants (practitioners) relate their experience of RM implementation in water and power projects in SA from the beginning to the end, illustrating the full picture from which the researcher is able to identify the elements of the process that cause its ineffectiveness.

3.3.1 The Stages of Grounded Theory

Silverman (1993:46) provides a simplified version of the stages of Grounded Theory, as follows:

1. "*... an initial attempt to develop categories which illuminate the data*".

2. "*... an attempt to saturate these categories with many appropriate cases in order to demonstrate their relevance*".

3. "*... developing these categories into more general analytical frameworks with relevance outside the setting*".

In trying to clearly define the stages of Grounded Theory, the researcher is guided by the work of Corbin (1986), who was influenced by Glaser and Strauss (1967). Having also studied research conducted by Glaser and Strauss (1967), Chenitz and Swanson (1986), and Strauss and Corbin (1998), the researcher believes that the stages suggested by Corbin (1986) encapsulate the essential characteristics of the process. These stages are now outlines.

Stage 1: Discovering and Developing Categories

The use of in-depth interviews is the primary method for initial data collection in this study, since the outcome of such process is the emergence of concepts upon which theory can be produced. The task of the researcher is to constantly analyse the relational aspects of the constituent concepts emerging from the data, and Grounded Theory allows for such examination and for the explication of relational conceptual aspects. In analysing the data acquired from the in-depth interviews, provisional descriptions or concepts are recorded, with the proviso that the description 'fits' the data. As Glaser and Strauss (1967:3) emphasise, "*by 'fit' we mean that the categories must be readily (not forcibly) applicable to and indicated by the data under study. By 'work' we mean that they must be meaningfully relevant to and be able to explain the behaviour under study*".

Corbin and Strauss (1998:114) define categories as "*concepts, derived from data that stand for phenomena ... they answer the question 'What is going on here?*'" They go on to further define how categories are described by considering three aspects, these being: the perspective of the analyst, the focus of the research, and the research context.

A 'constant comparative analysis' will generate conceptual categories and their conceptual properties, which in turn have the potential to create hypotheses expressing generalised relations between the properties. A consistent theme among Grounded Theorists (Glaser and Strauss, 1967; Strauss and Corbin, 1998; Chenitz and Swanson 1986) is the continuing and in-depth questioning of the emerging data, ranging from the personal motivations of the researcher to the unit of analysis. Such is the process by which categories emerge. Thus, this line-by-line analysis of the data, based on incidents and facts, leads to the formation of initial

concepts and abstractions. In turn these help the researcher to formulate core categories. As the data emerges, the researcher begins to ask such questions as: "Into which category does this concept fit?" The entire process is marked by a general saturation of the data, and further development of categories stems from the determination of their 'properties' and 'dimensions'. "*Properties are the general or specific characteristics or attributes of a category, dimensions represent the location of a property along a continuum range*" (Strauss and Corbin, 1998:117). Dimensions are often expressed as a time-scale, applied to properties. This process, the first stage of theory building, can be expressed diagrammatically.

Identifying similarities and differences across categories is an essential part of the progression of data analysis, and is useful both in discovering initial categories and for building others. Drawing on the extant literature as well as comparing former experiences is one useful way of making comparisons. In turn, this forms the basis of emergent 'substantive categories', which serve to further clarify and extend any sub-categories.

An essential part of the Grounded Theory methodology is the constant theorising that occurs in the recording of 'theoretical memos'. Chenitz and Swanson (1986:6) capture the essence of this process when they explain: "Memos are the written capsules of the analysis and serve to store the ideas generated about the data". Thus, in the development of each concept, an accompanying memo explicates and deepens the possibility of emerging hypotheses. This process provides an opportunity for the researcher to stand back from the data and examine the relationships between codes and categories.

Stage 2: Theoretical Sampling

> "*Theoretical sampling is the process of data collection for generating theory whereby the analyst jointly collects, codes, and analyses his data and decides what data to collect next and where to find them, in order to develop his theory as it emerges*" (Glaser and Strauss, 1967:45).

Research sampling is based on the notion of 'representativeness', which relates to the repeatability of the phenomena in similar contexts. In Grounded Theory, representativeness is sought within the emerging categories; thus, theoretical sampling guides data collection and both data collection and analysis occur simultaneously. Strauss and Corbin (1998:202) describe the purpose of theoretical sampling as being "*to maximise opportunities to compare events, incidents, or happenings to determine how a category varies in terms of its properties and dimensions*".

Knowledge of where to begin sampling is informed by the researcher's experience and knowledge of the area under study. When applying the constant comparative method of analysis (Glaser and Strauss, 1967) the researcher is faced with two questions:

1. What groups or sub-groups should be covered by the next data collection?

2. And, for what theoretical purpose? (Glaser and Strauss 1967:47)

The key factor in selecting further sites for data collection is their theoretical relevance; the selection must assist the researcher in maximising the generation of as many properties of a category as possible, and in identifying the relation of categories to each other. This is achieved through reflection on theoretical memos, the written record of response, reflections, and theoretical linkages. The desired outcome of this process of constant comparison, analysis and reflection is that it will eventually result in the "saturation of data", such that "*no additional data are being found whereby the sociologist can develop properties of the category*" (Glaser and Strauss, 1967:61). At this stage of the research, it is expected that factors such as time and money will influence the point of 'saturation'. Further research is always a possibility, and in no way invalidates the end point of data collection in earlier studies. The next task of the research is linkage.

Stage 3: Linking the Categories

Linkages must be made so that order can be created from the emerging categories. This process begins early in the research, as the researcher pays close attention to the relatedness of

categories and existing theory. Linkages are identified through constant reflection on the theoretical memos. However, Corbin warns that "*making linkages should not begin too soon, because it tends to foreclose on category emergence and development*" (1986:98). Central to this process of linkage is the task of constantly contextualising the phenomenon being studied, by discovering the relationship between structure and process. 'Structure' relates to what and how, whereas 'process' asks 'why?' In discussing the progression of data analysis from coding to theory generation, Swanson (1986), drawing on Glaser (1978), suggests a paradigm or family of theoretical codes, which he calls the six Cs: causes, contexts, contingencies, consequences, co-variances, and conditions. These ask the following questions of the data:

- What causes this phenomenon to occur?
- What are the consequences of this phenomenon occurring?
- What is the nature of the context where the phenomenon occurs?
- What conditions pertain to the occurrence of this phenomenon?
- What is the occurrence of the phenomenon contingent upon?
- What is the covariance, that is, the relationship between the variables, in this phenomenon?

On making relevant connections to existing theory, Glaser and Strauss are unequivocal on two points:

1. The 'fit' of theory to data must be "*readily (not forcibly) applicable to and indicated by the data under study*".

2. The data must 'work' in that, *"they must be meaningfully relevant to and be able to explain the behaviour under study*" (1967:53).

Corbin and Strauss argue that 'validating' a theory is determined by how well the abstraction fits with the raw data, and also "*... whether anything salient was omitted from the theoretical scheme*" (1998:159). Thus, once the categories have been built and linkages have been made, it is necessary to determine the core category.

Stage 4: Identifying the Core Category

"To understand a basic social process (BSP), it is helpful to first view it as a core category" (Fagerhaugh, 1986:135).

When determining a core category, the researcher is in a position whereby s/he can initially identify one category as being central to the theory; this category will have cropped up frequently in the data, will be logical in its explanation (fit), abstract in nature, capable of in-depth explanatory power, and can explain variation of categories (Corbin and Strauss, 1998:147). The identification of this category is arrived at through the constant and ongoing analysis of data, applying the six Cs of theoretical coding. Corbin and Strauss, defining the central or core category, write "*In an exaggerated sense, it consists of all the products of analysis condensed into a few words that seem to explain what 'this research is all about*" (1998:146).

Stage 5: Refining the Theory

The process of integrating and refining the theory is the penultimate step, coming just before write-up and presentation. Whilst the integration of the theory starts alongside the actual theorising, this process of refinement is the final task, and consists of the trimming of excess data, which do not fit the category, and filling in poorly defined categories to progress them to completion. Categories must be capable of internal variation and be tested for 'negative cases' to ensure the credibility of the proposed theory. This will go some way towards testing the reliability of the theory. If one acknowledges that a traditional expectation of reliability is that a study can be replicated (Kerlinger, 1973), this would mean that an apparent lack of reliability would be a major critique of Grounded Theory as a methodology. Chenitz and Swanson therefore suggest that a more appropriate question to ask of research using Grounded Theory would be: "*If I apply this theory to a similar situation, will it work, that is, allow me to interpret, understand, and predict phenomena?"* (1986:13).

Grounded Theory is a naturalistic epistemology. Lincoln and Guba (1985:219, citing Guba, 1981), in a defence of naturalistic inquiry, convey four new terms by which Grounded Theory can be evaluated, "'credibility' (in place of internal validity), 'transferability' (in place of

external validity), 'dependability' (in place of reliability) and 'confirmability' (in place of objectivity)". They further suggest that triangulation, negative case analysis, and member checking can be used to establish credibility, thick description, to facilitate transferability, and auditing, to establish dependability and confirmability.

3.3.2 Justification for the Adoption of Grounded Theory

Grounded Theory has been adopted as the means of pursuing this investigation into the RM procedures practised in IWPP projects for several reasons. One such reason was the scientific rigour attributed to the process in its methodological approach to data collection and analysis. This is systematic, there is no room for diversion, and consequently, the researcher is assured that having closely followed the stages in the process, the outcomes are likely to be sound. Strauss and Corbin (1990:57) indicated that the principal advantages from adopting the analytical procedures within a grounded theory included the fact that the study would benefit from: "*the rigour necessary to ensure any relationships that were discovered as a result of good science, and the ability to ground the emergent data in order to build the density, develop the sensitivity, and initiate the integration needed to generate a tightly woven, explanatory theory or set of relationships that closely approximates to the reality that it represents*".

A further reason for adoption of this approach was the need for the processes of data collection and analysis to be a closely related. The method calls for the data analysed to subsequently direct the collection of further data from practitioners in the field. Strauss and Corbin (1990) maintained that it was possible to establish conceptual relationships by the systematic exploration of potential linkages. Therefore, this and other issues related to the interpretative research process necessitated further consideration.

Moreover, the variables in the phenomenon under investigation are largely unknown, and therefore, it was necessary to focus on context as a means of shaping the understanding derived.

3.4 Research Methods and Methodology

Research methodology is the study of how research is undertaken, how researchers learn about phenomena and relationships, and how knowledge is gained. In other words, methodology is about the principles that guide research practices, and why certain practices logically follow on from certain principles. It embodies the notion of rationalisation, explaining why particular methods or tools are used in any given study. McGregor and Murname (2010:2) discuss this, stating:

> "*The word methodology comprises two nouns: method and ology, which means a branch of knowledge; hence, methodology is a branch of knowledge that deals with the general principles or axioms of the generation of new knowledge. It refers to the rationale and the philosophical assumptions that underlie any natural, social or human science study, whether articulated or not. Simply put, methodology refers to how each of the logic, reality, values and what counts as knowledge inform research*."

Fellows and Liu (2005:31) defined research methodology as "*the principles and procedures or logical thought processes which could be applied to scientific investigations*".

Research methods are the tools, techniques, or processes that can be applied in the research, and these might be, for example, surveys, interviews, and participant observation. Methods and the way in which they are employed, are shaped by methodology.

3.5 Quantitative and Qualitative Research Strategies

A research study is a systematic investigation to find answers to a problem. In social science areas, research has generally followed the traditional objective scientific method found in use in other areas. However, since the 1960s, a strong move towards a more qualitative, naturalistic, and subjective approach has left social science research

divided between two competing methods, these being, the scientific empirical tradition, and the naturalistic phenomenological mode. Ever since then, there has been widespread debate regarding the differences between qualitative and quantitative research strategies (Sale et al., 2002).

In the scientific method, quantitative research methods are employed in an attempt to establish general laws or principles. Such a method assumes social reality to be objective and external to the individual. The naturalistic approach to research on the other hand emphasises the importance of the subjective experience of individuals, and thus collects qualitative data, generally in the form of words. Social reality is regarded as a creation of individual consciousness, with meaning and evaluation of events seen as personal and subjective construction. Such a focus on the individual case rather than general law-making is termed the ideographic approach (Creswell, 1994; Naoum, 2003).

Burns, (2000:3) describes the quantitative method as: "*inquiry into a social or human problem, based on testing hypothesis or a theory composed of variables, measured with numbers, and analyzed with statistical procedures, in order to determine whether the hypothesis or theory hold true*".

Quantitative research consists of those studies in which the data concerned can be analysed in terms of numbers. Conversely, research that is qualitative in nature – that describes events, persons, and so forth scientifically can be conducted without the use of numerical data.

Quantitative research is based more directly on its original plans and its results are more readily analysed and interpreted. It is empirical inquiry which collects data in numerical form, whereas qualitative research is empirical research which gathers data that are not in the form of numbers (Punch, 1998). Qualitative research is more open and responsive to its subject.

Despite these obvious variations in approach, however, both quantitative and qualitative types of method are valid and useful, and indeed, in the same study, they are not mutually exclusive, so as noted by Best and Khan (1989) a single investigation might well adopt both methods. That said, qualitative research is harder to conduct, more stressful and more time-consuming than other types; and it is only suitable for people who care about it, take it seriously and are prepared for commitment (Delamont, 1992).

The tendency when using quantitative research methods is to collect numerical data from relatively large-scale and representative samples, the approach often presented as being about gathering 'facts'. In contrast, qualitative methods are concerned with collecting and analysing information in as many forms, chiefly non-numeric, as possible.

According to Fellows and Liu (2003), the quantitative approach merely involves the application of established theories and laws; hence, the wheel is not reinvented for each new study. On the other hand, the qualitative approach is an exploration of a new subject which is conducted without prior formulations but with the prime intention of gaining understanding, information, and data, that can lead to the formulation of new theories (Fellows and Liu, 2003). Hence, qualitative research is a precursor to quantitative research.

Tables 3.1 and 3.2 present the strengths and limitations of both the quantitative and qualitative approach.

Strengths	Limitations
Precision - through quantitative and reliable measurement	Because of the complexity of human experience, it is difficult to rule out or control all the variables
Control - through sampling and design, provide answers to ambiguous answers to questions	Because of the urgency, people do not all respond in the same ways as inert matter in the physical sciences.

Ability to produce causality statements, through the use of controlled experiments.	Its mechanical ethos tends to exclude notions of freedom, choice and moral responsibility.
Statistical techniques allow for sophisticated analysis.	Quantification can become an end in itself.
The data obtained from an experiment must be reliable and can be replicated.	It fails to take account of people's unique ability to interpret their experience, construct their own meanings and act on these.
	It leads to the assumptions that facts are true and the same for all people all of the time.
	Quantitative research often produces banal and trivial findings of little consequences due to the restriction and the controlling variables.
	It is not totally objective because the researcher is subjectively involved in the very choice of a problem as worthy of investigation and in the interpretation of the results.

Table 3.1: Basic Features of the Quantitative Approach (Source: Burns (2000:9-10))

Strengths	**Limitations**
Because of close researcher involvement, the researcher gains an insider's view of the field. This allows the researcher to find issues that are often missed (such as subtleties and complexities).	Problems with adequate validity or reliability. Because of the subjective nature of qualitative data and its origin in single contexts, it is difficult to apply conventional standards of reliability and validity
Qualitative descriptions can play the important role of suggesting possible relationships, cause, effects and	Contexts, situations, events, conditions and interactions cannot be replicated to any extent nor can generalisations be made to a wider

dynamic processes.	context than the one studied with any confidence.
Because statistics are not used, the qualitative researcher uses a more descriptive and narrative style, this research might be of particular benefit to the practitioner as she or he could turn to qualitative reports in order to examine forms of knowledge that might otherwise be unavailable, thereby gaining new insights.	The time required for data collection, analysis and interpretation is lengthy.
Adds flesh and blood to social analysis.	Researcher's presence has a profound effect on the subject of study
	Issues of anonymity and confidentiality present problems when selecting findings.
	The viewpoints of both researcher and participants have to be identified and elucidated because of issues of bias.

Table 3.2: Basic Features of the Qualitative Approach: Source (Burns (2000:13-14))

3.5.1 When to Combine the Philosophical Approaches

As indicated, despite the opposing views, there are times when the two philosophical approaches can be combined in social science research, and when this happens, the benefits of each outweigh the respective disadvantages. Additionally, according to Fellows and Liu, (1997), it may be necessary to combine the two approaches to gain a multi-dimensional view of the subject under investigation, and such a view may well be obtained through the synergy created by mixing qualitative and quantitative methods.

Punch (1998:247) commented on instances when it is appropriate to combine the two approaches, mentioning the following:

- *Logic of triangulation:* triangulation of data can occur when the findings from one type of study can be checked against the findings derived from the other type. For instance, the results of qualitative investigations might be checked against those from a quantitative study to look for similarities, confirmations, etc.
- *Qualitative research facilitates quantitative research:* qualitative research may help to provide background information on context and subjects, can act as a source of hypotheses, and can assist in the construction of measurement scales.
- *A mixed approach provides a general picture:* Quantitative research may be employed to plug the gaps that arise in a qualitative study because, for example the researcher cannot be in more than one place at any one time, and all the issues under investigation may not be amenable solely to a quantitative or a qualitative design. Miller and Crabtree (1998) noted that the relative merits of the differing research designs confirmed that combined or sequential designs are useful in allowing the results of one part of the study to develop the form of the following section.
- *Qualitative research facilitates quantitative research:* This usually means that quantitative research helps in the choice of subjects for a qualitative investigation.
- *Structure and process:* Quantitative research is especially efficient at identifying the structural features of social life while qualitative studies are usually stronger on process aspects.
- *Researcher's and subjects' perspectives:* Quantitative research is usually driven by the researcher's concerns, whereas qualitative research takes the subjects' perspective.
- *Problem of generality:* The addition of some quantitative evidence may help generalisation in qualitative research.
- *Qualitative research may facilitate the interpretation of relationships between variables:* Quantitative research readily allows the researcher to establish relationships among variables, but is often weak when it comes to

exploring the reason for those relationships. A qualitative study can be used to explain the factors underlying the broad relationship.

- *Relationship between macro and micro levels:* Employing both quantitative and qualitative research may provide a means of bridging the macro-micro gulf. Qualitative research can tap large-scale structural features of social life while qualitative research tends to address small-scale behavioural aspects.
- *Hybrids:* Qualitative research can be used to perform a quasi-experimental quantitative study.

Commenting on the issue of research in the construction industry, Abowitz and Toole (2010) state that as people play key roles in nearly all aspects of the industry, for research to be effective in this context, social science research methods must be employed. This is particularly true for researchers studying topics that involve human actions/behaviour in construction processes, such as leadership, innovation, and planning. In social science research, no single method of data collection (survey, experiment, and/or participant observation) is ideal since each one has inherent strengths and weaknesses. Consequently, whenever possible, the strategy of combining quantitative and qualitative approaches in research design and data collection should be considered. Although such mixed-methods research is more expensive in terms of time, money, and energy, than a single method approach, it brings the advantage of improving the validity and reliability of the resulting data and strengthens causal inferences by providing the opportunity to observe data convergence or divergence in hypothesis testing.

In quantitative research, the problem evolves from the existing literature, and this demands the presence of a substantial body of literature from which the researcher can derive hypotheses, and on which s/he can build. Variables are known and theories may exist that need to be tested and verified (Creswell, 2003). Experimental methods and quantitative measures are adopted to test hypothetical generalisations. This method however has been criticised for being inflexible and artificial. It is not very effective if

the objective of the research is to understand a process or to determine the significance people attach to an action. In this context, Fellows and Liu (2003) state that the work is unaffected by the beliefs and values of the researchers involved, and hence, is independent of the person conducting the research.

Qualitative research on the other hand is fundamentally concerned with understanding the meaning of what people bring to 'things' – events, projects, products, brands, places, people and relationships (Gordon, 1999). This philosophical approach is based on the understanding of the accounts of the social world which have to be drawn from the individuals or members of the community themselves, based on what they practise in their daily lives. A researcher needs to understand the situation and provide plain or social science interpretations in the description of the situation (Mason, 1996). Gilham (2000:11) states that qualitative research is an avenue for a researcher "to investigate situations where little is known about what is there; and what is going on; and to explore complexities that are beyond the scope of more controlled approaches". For exploring the nature of problems or drawing inferences from the data provided, a qualitative research approach is advocated (Loosemore, 1998).

Miles and Huberman (1994:10) emphasise that qualitative data "*focus on naturally occurring, ordinary events in natural settings, so that we have a strong handle on what real life is like*". The stress which qualitative data places on people's lived experience, makes such data suitable for locating the meanings people place on the events, processes and structures of their lives, their perceptions, their assumptions, prejudgments and presuppositions (Manen, 1977; Miles and Huberman, 1994). The collection of qualitative data requires a researcher to be in close contact and undergo active interactions with the subjects in order to make interpretations based on their descriptions of their activities, and to provide subsequent explanations of those situations.

Strauss and Corbin (1990:17) broadly explained qualitative research as "*any kind of research that produces findings not arrived at by means of statistical procedures or*

other means of quantification". The strength of qualitative research is in its exploratory nature and in its ability to provide the researcher with guidance when s/he does not know the important variables to examine.

As indirectly referred to earlier, theory plays a fundamental role in differentiating between a deductive mode of research in quantitative study and an inductive mode of research in a qualitative study.

3.5.2 Deductive and Inductive Modes of Research

The deductive mode of research takes the path from the general to the specific, and is sometimes referred to as a top-down approach. In this, a researcher might begin by identifying or creating a theory concerning a topic of interest, and from that developing a specific hypothesis that can be tested. This can be narrowed down even further when observations are made to formulate extremely tight hypotheses, which are ultimately tested to confirm or reject the original theories (Trocim, 2006).

In complete contrast, the inductive mode starts from specific observations and moves to make broader generalisations and to formulate theories. This strategy is sometimes referred to as the bottom-up approach. From its particular observations and measures, it seeks to detect patterns and regularities, suggests tentative hypotheses that can be explored, and ultimately develops general conclusions and/or theories (Trocim, 2006).

These two methods of reasoning promote a very different culture within research projects. Inductive reasoning, by its very nature, is more open-ended and exploratory, especially at the beginning, whereas deductive reasoning is more prescribed and focused on testing or confirming hypotheses. However, Trocim (2006) makes the point that despite the two approaches being methodologically opposite, most social research involves both inductive and deductive reasoning processes, even though a study may initially give the impression that it is either one or the other; and even in the most constrained experiment, researchers may observe patterns in the data that lead them to develop new theories.

Sekaran (1992) distinguishes these modes of research by focusing on the hypothesis, and asking whether the hypothesis or inference is drawn before or after the data is collected. A pool of data is collected at the initial part of inductive research from which a set of hypotheses are derived and tested, whereas in deductive modes, hypotheses or assumptions are constructed from observations before collecting the data required to test them.

3.5.3 Purposes of Adopting Quantitative or Qualitative Research Modes

Having described the nature of quantitative and qualitative research modes, it is appropriate to consider why a researcher would choose one in preference to the other, and in this connection, it is clear that the methods involved give some clue. In respect of quantitative research, the main aim is to quantify data such that generalisations can be made from one sizeable sample to an entire population of interest. Qualitative research does not have the same purpose since it is used to gain an in-depth understanding of underlying reasons and motivations, thereby providing insights into problems, and making suggestions for further research, and for specific hypotheses which can subsequently be tested with large samples (in a quantitative mode).

Burns (2000) highlights the main methodological differences between quantitative and qualitative research as lying in the data sample, data collection procedures, data analysis, and outcomes. Data collection in qualitative research is seldom based on unstructured or semi-structured methods but rather on methodologically flexible techniques, for example individual in-depth interviews or focus group discussions that are suited to the collection of details and that promote a comprehensive view. Quantitative research uses highly structured, and rigid techniques such as questionnaires, which limit the expression possible from respondents as there is no room for elaboration, and often the answers are forced into pre-defined categories. This is entirely justified on the basis that statistical analysis of large numbers of questionnaires would not be possible in the absence of well-defined parameters.

Qualitative data analysis is non-statistical; its methodological approach is primarily guided by the concrete material at hand. In quantitative research, the sole approach to data is statistical and takes places in the form of tabulations. Findings are usually descriptive in nature although conclusive only within the numerical framework. It is a frequently held prejudice that quantitative research is objective, and that qualitative research is subjective (Burns, 2000), but this represents a gross oversimplification and it is more appropriate to compare the two approaches to establish which is more suited to the task in hand, as follows:

- Quantitative research seeks out explanatory laws whereas qualitative research aims more at in-depth description.
- Quantitative research measures, in the hope of developing universal laws whereas qualitative research can be described as an exploration of what is assumed to be a dynamic reality.
- Qualitative research does not claim that what is discovered in the process is universal, and thus, replicable.
- Qualitative research generates rich, detailed and valid process data that contribute to the in-depth understanding of a context.
- Qualitative analysis involves a constant interplay between theory and analysis, such that patterns can be discovered, possible causal links, and changes established.
- Quantitative research generates reliable population-based and generalisable data that is suited to establishing cause-and-effect relationships.

Ultimately, the decision of whether to choose a quantitative or a qualitative design is a philosophical one, depending on the nature of the project, the type of information needed for the context of the study, and the availability of resources (time, money, and humans). However, in opting for a qualitative design, there are still a number of traditions which are available for the researcher to consider. Table 3.3 outlines and compares these.

Dimension	*Biography*	*Phenomenology*	*Grounded Theory*	*Ethnography*	*Case Study*
Focus	Exploring the life of an Individual.	Understanding the essence of experiences about the phenomenon.	Developing a theory grounded in data from the field.	Descriping & interpreting a cultural & Social group.	Deveping an in-depth analysis of a single case or multiple cases
Discipline of Origin	* Anthropology * Literature * History * Psychology * Sociology	* Philosophy, Sociology Psychology	* Sociology	* Cultural anthropology, Sociology	*Poltical science, Sociology, evaluation, urban studies, other social sciences
Data Collection	* Primarily interviews and documents	* Long interviews with up to 10 people	* Interviews with 20 - 30 individuals to 'saturate' categories and details a theory	* Primarily observations & interviews with additional artifacts during extended time in the field (e.g 6 months to a year	* Multiples sources - documents, archival, records, interviews, observations, physical artifacts
Data Analysis	* Stories * Epiphanies * Historical content	* Statements * Meanings * Meaning themes * General descriptions of the experience	* Open coding * Axial coding * Selective coding * Conditional matrix	* Description * Analysis * Interpretation	* Description * Themes * Assertions
Narrative Form	* Detailed picture of an individual's life	* Description of the 'essence' of the experience	* Theory or theoretical model	* Description of the cultural behaviour of a group or an individual	* In-depth study of a 'case' or 'cases'

Table 3.3: Features of Qualitative Research Traditions (Source: Creswell (1998:65))

3.6 Data Gathering: Setting and Approaches

According to Silverman (2001), and Block and Block (1982), there are four techniques which may be applied in gathering qualitative data, namely observation, analysing text and documents, interviews, and recording

Interviews are especially common in qualitative research (Mason, 1996), and as noted by Gilham (2000), these are conducted with the intention to obtain information and understanding of issues relevant to the general aims and specific questions of a research project. They are useful when a researcher is unable to observe how people interpret a particular phenomenon or situation. Burgess (1984), and Kahn and Cannel (1957) consider the interview to be a conversation with a purpose, and hence, this implies an in-depth exercise which occurs as a result of a fair loose, or at least, a semi-structured approach.

This indicates a different type of interview from that associated with survey interviews since these are usually performed to elicit objective answers, and are essentially categorised as quantitative in nature. They tend to be structured, and comprised of closed questions to which standardised responses are required, whereas for qualitative research, the interviews are much more loosely-structured, giving the opportunity for issues to be pursued and explored.

3.6.1 Data Collection Procedures

The best method to collect data must of course be determined for any research study, on the basis of what data is required. Bala (2005) notes that when collecting primary data, questionnaires (both self-administered, and interview-administered), open-ended interviews, focus group discussions, and observations, are all appropriate; and that when collecting secondary data, documents, records, and reports made by others, form the sources.

It is important to compare all these procedures to establish their comparative advantages and disadvantages before making a final choice, and to note in that comparison that certain ethical guidelines, and methodological requirements pertain to each.

3.6.1.1 **Questionnaires**

Questionnaires provide a quantitative means of conducting research, and have been used for almost two centuries. Emile Durkheim (1858-1917) advocated the use of questionnaires, which represent a positivist approach and that usually have only a low level of researcher involvement, yet a high number of respondents. Bryant (2014) notes the following types of questionnaire and the relative strengths and limitations:

- Postal questionnaires: these are mailed to respondents with a stamped envelope for return to the researcher. They provide a relatively inexpensive way of gathering data, especially if respondents are dispersed over a large geographical area, and have the advantage that they can obtain data quickly, and that respondents have the freedom to complete the questionnaire without the researcher's interference.
- Telephone questionnaires: these are administered over the telephone, and are used often by market research firms or marketing departments. They are not usually regarded as satisfactory by sociologists.
- Electronic questionnaires: these are emailed to potential respondents, and as noted by Payne and Payne (2004), are a useful means of contacting dispersed groups of people, or those who might not wish to be questioned face-to-face.
- Personally-administered questionnaires: these are administered by the researcher or his/her assistants and have the advantage that they can gather more data than mailed or telephone questionnaires since it is possible for the researcher to create some rapport with the respondents, and they generate a higher response rate. However, the sample is usually a convenience one and hence, the results cannot be generalised.

Having decided how to administer a questionnaire, it is appropriate to consider what types of question should be included in its design. In this respect, questions can be seen to tall into three main categories as follows:

a. Contingency questions - A question that is answered only if the respondent gives a particular response to a previous question. This avoids asking questions of people that do not apply to them (for example, asking men if they have ever been pregnant).

b. Matrix questions - Identical response categories are assigned to multiple questions. The questions are placed one under the other, forming a matrix with response

categories along the top and a list of questions down the side. This is an efficient use of page space and respondents' time.

c. Closed questions - Respondents' answers are limited to a fixed set of responses. Most scales are closed ended. Other types of closed questions include:

- ✓ Yes/no questions - The respondent answers with a "yes" or a "no".
- ✓ Multiple choices - The respondent has several options from which to choose.
- ✓ Scaled questions - Responses are graded on a continuum (example: rate the appearance of the product on a scale from 1 to 10, with 10 being the most preferred appearance). Examples of types of scales include the Likert scale, semantic differential scale, and rank-order scale (See scale for a complete list of scaling techniques).
- ✓ Open ended questions - No options or pre-defined categories are suggested. The respondent supplies his/her own answer without being constrained by a fixed set of possible responses.

The use of a structured questionnaire brings a number of advantages as follows:

I. The researcher is able to contact large numbers of people quickly, easily, and efficiently using a postal questionnaire.
II. Questionnaires are relatively quick and easy to create, code and interpret (especially if closed questions are used).
III. A questionnaire is easy to standardise. For example, every respondent is asked the same question in the same way. The researcher, therefore, can be sure that everyone in the sample

answers exactly the same questions, which makes this a very reliable method of research.

IV. Questionnaires can be used to explore potentially embarrassing areas (such as sexual and criminal matters) more easily than other methods.

Nonetheless, there are disadvantages of a structured questionnaire, which are:

I. The format of questionnaire design makes it difficult for the researcher to examine complex issues and opinions.

II. With a postal questionnaire, the researcher can never be certain the person to whom the questionnaire is sent actually fills it in.

III. Where the researcher is not present, it is always difficult to know whether or not a respondent has understood a question properly.

IV. The researcher has to hope the questions asked mean the same to all the respondents as they do to the researcher.

V. The response rate (that is, the number of questionnaires that are actually returned to the researcher) tends to be very low for postal questionnaires.

Questionnaire design is a long process that demands careful attention, since the potential is for the instrument to be a powerful evaluator, but without good design it loses this potential. The design begins with an understanding of the capabilities of a questionnaire and how these can help the research objectives. These must be planned precisely so that they are susceptible to questionnaire treatment. Essentially, the use of a questionnaire implies a scientific experiment in which hypotheses are generated, and data to support or reject those, gathered. Consequently, the instrument must be both valid and reliable. In this respect it should be noted that:

a. Questionnaires generally have low validity because they do not explore questions in any detail or depth. Complex issues, requiring a respondent to explain his/her reasons for believing something, are difficult to explore.

b. Where closed questions are used the respondent is restricted to answers using categories provided by the researcher and there is little opportunity to qualify the meaning of answers. Similarly, the questions asked are, by definition, those considered important by the researcher. It is easy, therefore, to miss important information because appropriate questions are not asked.

c. However, the fact postal questionnaires can be anonymous means that respondents may be encouraged to answer questions truthfully in the knowledge that they cannot be identified. This may increase the validity of their responses.

As far as research in the construction industry is concerned, Root and Blismass (2003) recognise personal engagement and process simplification as the two key areas that must be given priority and focus by the researcher, since with consideration of these aspects, the response rate to postal surveys may be improved. Personal engagement requires some personalisation of a questionnaire, such as an individually-signed letter, in order to gauge the interest of the respondent. Process simplification, on the other hand, calls for the simplification of each step of the process such that the respondents are presented with a self-addressed envelope to encourage them to return the completed questionnaires.

In the preparation of the questionnaire, much attention should be given to the questions since if these are inappropriate, incorrectly ordered, are devised with poor scaling, or produced in a poor format, the survey can lose its value. Any of these shortcomings can cause confusion for the respondent, meaning that views may not be accurately recorded. It is helpful, therefore, to pre-test any questionnaire with a smaller sub-set of the target participants, since this will

highlight any problems with the instrument and give the opportunity for modification before it is used with the larger population.

3.6.1.2 **Interview**

The interview is a method of data collection that involves two or more people exchanging information through a series of questions and answers. The questions are designed by the researcher to elicit information from the interviewee on a specific topic or set of topics. Typically interviews involve a meeting between two people, but need not be limited in this way, nor must they necessarily occur in person, as they can be held over the telephone. The intention is to capture the interviewee's opinion on the issue(s) of interest (Patton, 1990).

Patton (1990) categorised interviews into three general types, these being the informal conversation, the general interview approach, and the standardised open-ended interview. Oppenheim (1992), on the other hand, classified interviews into the two categories of exploratory interview, and standardised interview. He included the in-depth or free-style interview in the former approach, and public opinion polls, market research and government surveys in the latter.

Interviews provide an excellent means of gathering detailed information, and have certain advantages over surveys. One is that they allow the interviewee to follow up on comments made by interviewees that might not have been expected, and therefore, more information can be obtained, whereas a survey does not have this potential. Additionally, in an interview the researcher can learn the story behind a response, and it might be that if the interview is used together with a questionnaire, this story might be generalised to the answers from questionnaires.

Interviews are also useful when the topic is complex, when lengthy explanations are required, or when the topic or answers to the questions may not be immediately clear to participants who may need some time or dialogue with others in order to work through their responses. In such circumstances, new questions that had not been raised in previous interviews may well arise because each person's story is unique. Johnson (2002) notes that the interview is suitable

for qualitative research because it furnishes ‘deep’ understanding in several contexts. Amongst others, it provides;

a. Deep understanding of the beliefs held by interviewees in relation to their everyday activities, or events, or a place.
b. Deep understanding of some cultural form, activity, event, place or artefact that is usually hidden from direct view.
c. Deep understanding of how common sense assumptions, practices, and ways of talking, constitute the interviewees’ interests and how they themselves appreciate these.
d. Deep understanding of all the above such that the researcher is able to articulate these.

Smith et al. (2002) say of the in-depth interview that it may be totally unstructured or semi-structured, but that it is typically open-ended in nature, and is suitable when:

a. the purpose is to seek understanding of the constructs that the interviewee uses as a basis for his/her opinions and beliefs about a particular matter or situation.
b. the aim is to develop an understanding of the respondent’s world
c. the step-by-step logic of a situation is not clear
d. the subject matter is highly confidential or commercially sensitive.
e. the interviewee may be reluctant to be truthful other than in a one-to-one situation.

In this study, the aim is to secure in-depth understanding of the RM process in IWPP projects in SA, and this can only be secured via a qualitative approach in which interviews are employed, since as noted by Fellows and Liu (2008), questionnaires are inadequate to acquire this type of knowledge. Consequently, semi-structured interviews were chosen.

3.6.2 Validity and Reliability

Whenever a test or other measuring device is used as part of the data collection process, the validity and reliability of that test is important, since as noted by Heffner (2011), the results of a study are often relied upon to show support or otherwise for the theory proposed, and if the data collection methods are neither valid nor reliable, the data will be inappropriate.

Validity refers to the degree to which the test or other measuring device truly measures what it is intended to measure. According to Heffner (2011), the test question "1 + 1 = ___" is certainly a valid basic addition question because it is truly measuring a student's ability to perform basic addition. It becomes less valid as a measurement of advanced addition because as it addresses some required knowledge for addition, it does not represent all of the knowledge required for an advanced understanding of addition.

Reliability as described by Fellows and Liu (1996), is essentially 'repeatability'. A measurement procedure is highly reliable if it gives the same result in the same circumstances time after time, even when that procedure is performed by different people. Reliability may further be divided into external reliability and internal reliability. The former relates to the consistency of a measure over time whilst the latter provides an estimate of the 'consistency' of responses towards the items or a sub-set of the items on the same measure (Chen and Krauss, 2004). The purpose of the reliability test is to minimise the errors and bias in a study to ensure that future researchers who wish to adopt the same procedures can do so in the knowledge that they have the capacity to generate the same findings and conclusions for the same kind of research.

Punch (2000) surmises that in the context of a quantitative paradigm, two methods are available to verify the validity of a given research, and that either method can be used to test the reliability of a measuring instrument. They come in a form of test, re-test and split-half approach. The test/ re-test addresses for external reliability, while split-half addresses internal reliability (Fellows and Liu, 2005).

In a qualitative paradigm, however, validity concerns the degree to which a construct really is representative of what it is intended to represent (Fellows and Liu, 2005). Qualitative researchers have developed their own criteria for explaining reliability and validity (Miles and Huberman, 1994; Smith et al., 1991; Yin, 1994), stressing that reliability does not play a major role in qualitative studies. In this respect, Miles and Huberman (1994) emphasise the need for improved and rigorous data gathering and analysis techniques as the best way to enhance credibility and acceptance, and hence, generate reliability. The focal point of validity in qualitative research is the nature rather than the amount of something (Fellows and Liu, 2005). Qualitative researchers rely, implicitly or explicitly, on a variety of understandings and corresponding types of validity in the process of describing, interpreting, and explaining phenomena of interest (Maxwell, 2010).

Part B: Adopted Research Methodology

The methodology actually adopted for the study is now presented in detail together with a justification for the choices made.

3.7 Epistemological Issue

This research calls for an explanation of how, why, and under what conditions, practitioners in Saudi Arabia implement RM in IWPP projects. Chiefly, the research focuses on what RM procedures are applied, how they are applied, and why they seem to fail, as evidence by the fact that 75% of IWPP projects did not meet their specified objectives.

In attempting to establish such explanations, the study pursues practitioners' perceptions of IWPP risk, and current RM implementation, and consequently, exploratory interview methods were determined as the best technique to use. This approach was necessary to be able to describe and analyse the dynamics involved in the RM processes as presented by those involved in discharging those processes. This approach is described by Bryman (1994) as possessing the core characteristics of an interpretive type of qualitative inquiry.

Mayku and Morehouse (1994) stated that all qualitative research is based on a phenomenological position which examines people's words and actions from their viewpoint as a means of obtaining insights into the process under investigation. Bryman (1994), however, pointed out that there are other intellectual undercurrents as well as phenomenology within the broad range of qualitative-type inquiries, and that such undercurrents run across various academic disciplines such as sociology, anthropology, and psychology.

The philosophical positions were identified by Bryman (1994) as being namely:

- *Symbolic interactionism*, in which social life is seen as "an unfolding process in which the individual interpreted his or her environment and acted on the basis of that interpretation";

- *Naturalism*, which seeks to treat any phenomenon under investigation in its "natural context and surroundings"; and
- *Ethnogenics*, which seeks to embrace the principles of "good science in the examination of the genesis of human social actions".

Miller and Dingwall (1997) stated that theoretical schools or traditions such as "symbolic interactionism, ethnomethodology, and phenomenology; should be distinguished from other more general approaches to research such as 'ethnography' or strategies of research design and analysis such as 'grounded theory'".

3.7.1 Research Problem and Epistemological Position

The research problem at the centre of this study is concerned with complex issues relating to RM in IWPP projects in SA, including why they fail to meet their objectives. Hence, the study must:

- Interpret the messages from practitioners,
- Evaluate the associations between various strands in the messages, and
- Establish a link between RM procedures and project failure.

Consequently, in order to develop a complete picture of the dynamics involved in the failure, it was necessary to secure insights from the precise words offered by practitioners in their descriptions of the RM procedures used in their routine activities. An interactionist approach was indicated in this respect, through which the researcher could glean the views of experienced individuals in the field and subsequently place those views within a more general conceptual framework that in turn could enable the development of appropriate theme or a model.

The research issue being investigated required the identification, categorisation, and exploration of the connections between distinct elements of a process at the same time discerning of the patterns of behaviour in terms of conceptualisation and possibly culture. The characteristics of such an investigation reflected what Loosemore (1999:11) indicated were

features of symbolic interactionism, in which "*meaning is socially constructed*". Tesch (1990) and Loosemore (1999) asserted that investigations that have their philosophical underpinnings in phenomenology and symbolic interactionism are best executed by making use of ethnographical or grounded theory-like approaches. In respect of the focus of the current study – the practical experience of the operation of IWPP projects in SA, very little information or understanding exists, as the entire subject is relatively new.

Denzin and Lincoln (1998:64) provided a rule of thumb heuristic (experienced-based technique for problem solving, learning, etc.) to assist in determining an appropriate choice of analytic approach for a research problem concerning the "*elucidation of the dynamics of a phenomenon*". In this case, the phenomena were the factors affecting the RM implementation. These researchers suggested that a problem that was only concerned with the identification of its nature was best obtained using "*ethnographical methods of participant observation*" (Denzin and Lincoln, 1998:64). However, if the questions under consideration concerned the explanation of an experience, process or procedure, such as in the current study, then a grounded theory approach would be the most appropriate of the available strategies to adopt.

3.8 The Interpretative Research Process

Having discussed the epistemological viewpoint underpinning the study, it is now appropriate to address the remaining issues related to interpretative research. Creswell (1994) established a checklist of issues to be considered before embarking on fieldwork phase, as follows:

- the consideration of data collection procedures,
- the identification of the researcher's theoretical sensitivity,
- the rationale behind the selection of participants, and
- the data analysis process to be adopted.

These issues are now discussed in terms of the current study.

3.8.1 The Data Collection Procedures

Bryman (1992:44) identified four main types of data collection methods namely: participant observation, interviews, life histories, and group discussion methods. As already indicated, this study adopts the in-depth interview as its research instrument, since the others are deemed to be inappropriate for one reason or another.

It was noted during the design stage of the study that the limited resources available in terms of time, money, and staff would disqualify participant observation as one option for data collection since as Miller and Dingwall (1997) observe, this method requires the researcher to be immersed in a prolonged period of exposure to the phenomenon under study. Only after such an experience is it possible to produce an in-depth account of the process under consideration. Moreover, Miller and Dingwall (1997:61) indicate that this method of data collection reveals the solutions that are produced in response to a problem, rather than the way in which the solutions were found. Consequently, as the actual process is being searched for in the current study, participant observation is not suitable.

Group discussions were also considered to be unfeasible since they require time and involve financial constraints, both of which could not be accommodated in the timescales and budget available for the study.

Consequently, and because of the advantages of interviews already highlighted, in-depth semi-structured face-to-face retrospective interviews were chosen as the source of qualitative data. It was believed that a more comprehensive understanding of the issues through narrative accounts could be gained (Djebarni, 1996; Gyi et al., 1999; Green, 1999; Chew and Tan, 2004), since via this mechanism, the researcher could enjoy the freedom to probe tangential issues as and when they arose during the interview.

Throughout the interviews, participants were encouraged to speak in their own terms on the research topic, and to clarify and extend their comments such that the researcher could capture the richness and complexity of what they had to offer, and have this explained to him in a comprehensible way (see Fontana and Frey. 1994; Tubin and Rubin, 1995). Hence, the

interviews operated as ‘conversations with a purpose (see Kahn and Cannell, as cited in Marshall and Rossman, 1999:108). The dearth of existing information pertaining to RM in water and power projects, required the researcher to discover as much as possible about the specific issues underlying this phenomenon, and as noted by Kavale (1983:174), the qualitative interview enables a researcher “*to gather descriptions of the life-world of the interviewee with respect to interpretation of the meaning of the described phenomena*”.

In formulating the questions for the interview, the research attempted to establish what McMenamin (2006:134) terms “*the geography*” of the subject, by reviewing all existing research that he considered to have relevance. In doing this, the researcher was also able to identify an area which had previously had been largely gone unnoticed by other researchers. Questions were worded to allow a free-flowing conversation with minimal interference, and were basically established as “*memory prompts of areas to be covered*” (Bryman, 2001:316)

3.8.1.1 **Interviews**

In conducting the interviews, the researcher followed his pre-determined outline but retained as much flexibility as was required to facilitate the free flow of conversation just mentioned (Patton, 1990). The interviews began with broad general questions, essentially to establish rapport and confidence among the interviewees, and then proceeded to a questioning strategy that was more specific. This began with a discussion of the context, and progressed to participants’ personal experiences, as suggested by Seidman (1991).

The frame of reference, used as an interview guide was developed basically to keep the conversation on track, and minimise the opportunity for irrelevant responses that might prove awkward in the analysis. It included the key issues to be explored, and these were introduced informally, in no specific order but rather in response to the way in which the conversations were progressing. Hence, the sequence of questions varied from one interview to another. That said the checklist (Appendix A) ensured that all relevant issues were probed with all participants, and that the scope of the discussions was appropriate and beneficial. There was no emphasis on objectivity, all interviewees were treated uniformly, and any other possible external influences were avoided (Preece, 1994).

The questions posed in the first round of interviews were as follows:

- What are the types of project commonly carried out by your organisation?
- What procurement methods are commonly used for the delivery of your projects?
- What are the typical problems encountered in those projects and how severe at they?
- What have been the eventual outcomes of those problems?
- Is risk assessment carried out at the beginning of the projects?
- What does the organisation consider as failure after project completion?
- Does the organisation understand and practise risk management procedures?
- What do you think about the current practice of risk management in the organisation?
- What is the current status of the risk management processes in WPP/IWPP projects? How are these being managed?
- Through your experience of WPP/ IWPP projects, what practical risk factors would you consider to be important?
- What are the main sources of WPP/ IWPP project failure in terms of risk?
- What are the main implementation barriers to the risk management process in WPP/IWPP projects?
- Do you use the risk management framework throughout the project lifecycle?
- How do you identify and manage the inherent risk factors associated with WPP/IWPP projects?
- After a project cycle, does the organisation undertake a lesson learnt workshop, to understand what went wrong and what lessons to put forward for future projects to refer to?
- Can developments to the risk management framework specified for IWPP projects contribute to enhance the success of future projects in terms of time, cost, and quality?
- Does the organisation have a risk manager/officer in place?
- What recommendations do you have to improve risk management in the future?

As can be seen, the above questions revolve around one central concept, that being the relationship between RM practices and the achievement (or otherwise) of WPP/IWPP project objectives. The questions were asked in a relaxed manner, and a natural flow of conversation encouraged in order to learn 'how' and 'why' the subject matter happened as it did (Yin, 2003). Via this process, the interviewees related their experiences about the events from the beginning until the end, thus presenting a comprehensive picture of the process of RM to which they were exposed. This picture emerged as a result of voluntary, rather than guided reflection (see appendix B and C).

All the interviews were conducted by the researcher, each began with the researcher thanking the interviewees for agreeing to participate, assuring the participants of total anonymity (names and organisations), and guaranteeing confidentiality in respect of the information they would provide. Consequently, the interviewees felt comfortable and tended to be candid in their responses and willing to provide the detailed level of information that was sought.

Digital voice recording was used throughout all of the interview sessions, thereby allowing the researcher to engage fully in face-to-face conversation with participants. This helped to maintain a smooth flow in the interviews, and facilitated the easy retrieval of the information gathered. All of the interviews were later transcribed verbatim by the researcher, so as to best represent the dynamic nature of the conversations (Seidman, 1991).

As indicated in the review of the literature concerning RM and construction projects, RM has a strong influence on the final outcome of projects, but there is insufficient empirical evidence relating to the precise context of WPP/IWPP projects in SA, and therefore, the choice of methodology – in-depth interviews, and the development of theory through the grounded approach, is believed to be very suitable.

3.8.1.2 **Criticism of the Chosen Data Collection Procedure**

As has been shown already, all types of data collection have strengths and weaknesses, but aside from their time-consuming nature (in conduct and transcription), interviews do yield

substantial, and rich data. In this study, the only genuine criticism was the need for interviewees to be articulate, but in the event this was not a problem, especially as the participants confirmed their preference for a face-to-face interview, which did provide the opportunity for clarification of any issue as part of the normal conversation.

The challenge of bias in the formulation of questions, and the artificial nature of the interview situation itself did not appear to be an issue as the questions were loose, and unstructured, and the interviews were conducted in the participants' own workplace settings, and at a time of their convenience and choosing.

3.8.2 Theoretical Sensitivity

Glaser and Strauss (1967), and Glaser (1978), discussed theoretical sensitivity, indicating this to refer to a personal quality possessed by the researcher characterised by an awareness of the subtleties of meaning of data. Different researchers bring varying degrees of sensitivity to the research situation, depending upon their previous reading of the published literature in the field, and their personal experience of the matter concerned. Such sensitivity can also be developed further during the research process. Essentially, it refers to the attribute of having insight, the ability to give meaning to data, the capacity to understand, and capability to separate what is pertinent from that which is not. All this is done in conceptual rather than concrete terms. It is theoretical sensitivity that allows one to develop a theory that is grounded, conceptually dense, and well integrated, and it simultaneously allows this to be done more quickly than if this sensitivity were lacking.

This is further supported by Strauss and Corbin (1990), who state that disciplinary or professional knowledge together with research and professional experience, may contribute to the researcher's theoretical sensitivity.

Glaser and Strauss (1967) explain that theoretical sensitivity arises from the researcher's ability to identify the important features of the data collected, perceive any variables (concepts, categories and properties) and the relationships among them, and then to assign

them meaning. This ability encourages the researcher to see beyond the surface appearance of the data, and so to identify theoretical possibilities (Glaser, 1978).

Glaser (1978) noted the role of the literature review in any study, in helping the researcher to understand how variables are constructed in the diverse fields, as working without any literature background may result in the researcher being submerged in the data without any theoretical context on which to draw, meaning that s/he will lose unique insight into the phenomenon. Reviewing the literature also helps to sharpen and develop theoretical sensitivity, subsequently giving substance to the process of analysis.

In respect of the current study, there is much available literature in the field of RM, and this has provided the researcher with an in-depth conceptual appreciation of the many variables related to RM, which were mainly unidentified.

However, when applying the technique of Grounded Theory, researchers are not encouraged to review the literature prior to a study, "for fear that over commitment to existing theories and concepts may prevent them from making new discoveries" (McLeod (1998:93). Consequently, it is necessary in a Grounded Theory study to be judicious in the way that the literature is used, and in this respect, that literature can be valuable as follows:

- It can establish the context for the research study. Gray (2004) suggests that GT researchers will already possess a certain level of knowledge about the subject, and use that to inform their research.
- It can (as noted by Glaser, 1992) guide the researcher's theoretical sensitivity to concepts which already exist and which seem important within the study.
- It can help in the initial fuelling of the researcher's motivation and formulation of research questions.
- It can help in stimulating questions during the analysis stage.
- It can help in stimulating questions during the initial interviews.
- It can help at the end of the study to confirm and modify existing theory using a symbolic interactionist framework as a philosophical basis for the construction of

meaning. This will influence the direction of the research in the way the researcher looks for the nature of the interaction of the respondents and their relationship to the systems to which they relate.

Theoretical sensitivity is further affected by the researcher's personal experience, knowledge and assumptions, which influence the meaning they find in the research data (Glaser and Strauss, 1967; Glaser, 1992). This point is further supported by Strauss and Corbin (1990), who argue that disciplinary or professional knowledge, together with research and professional experience, may influence the researcher's theoretical sensitivity.

A literature review helps a researcher to understand how variables are and have been constructed in a diverse field (Glaser, 1978), and embarking upon a research project without consulting any existing literature may leave the researcher with no idea whatsoever as to how to interpret this. Without any kind of theoretical context on which to draw researchers may fall into two traps: firstly, they may miss out on unique insights already provided by other researchers, and secondly, they may duplicate what has been done already (thereby making no contribution to knowledge whatsoever).

Clearly, a researcher should enter the research setting with as few predetermined ideas as possible (Glaser, 1978), even where theoretical exploration has been conducted through a literature review. This is because there is a tendency for the researcher to force, or otherwise try to fit new data with the established knowledge provided by the literature (Glaser, 1998), which also can lead the researcher to be hasty in completing his/her data analysis. Glaser recommends the method of constant comparison as an aid to temper the researcher's natural preconceived meanings, whilst still allowing for a subjective perspective to emerge (Glaser, 1992).

3.8.3 Selection of Participants

Given that GT is frequently used to investigate complex phenomena of which there is little pre-existing appreciation, it is important to ensure that the research sample is properly selected on the basis of the ability of individuals to make a sound contribution and help

illuminate details concerning the topic being explored. Variation sampling is often suggested to secure broad, information-rich participants in a research setting (Patton, 1990), and from such sampling it should be possible to develop emerging categories of information through the identification of conceptual boundaries and the specification of fit and relevance. In this way, sampling makes the categories more definitive and therefore useful.

Purposeful variation sampling, on the other hand, is used to ensure that diverse information is gathered. For the purpose of this research, interviewees were chosen on the basis of their experience and knowledge of the phenomenon being studied. The essence of such a sampling method is to collect data from the interviewees best able to answer the questions, rather than sampling a predetermined group of participants or settings (Glaser, 1978). Consequently, the interviewees who were chosen constituted a rich source of information on RM in water and power projects in SA.

3.8.4 Data Analysis

In respect of data analysis in GT, the point was clearly made by Glaser and Strauss (1967:103) that the method was "*not designed to guarantee that two analysts working independently with the same data will achieve the same results; it is designed to allow, with discipline, for some of the vagueness and flexibility that aid the creative generation of theory*".

The GT methodology uses three different types of coding in its analysis, these being: open, axial, and selective. Open coding is the first stage, which as noted by Strauss and Corbin (1990:63), is "*a part of the analysis that pertains specifically to the naming and categorising of phenomena through close examination of data*". This is followed by axial coding which "puts those data back together in new ways by making connections between a category and its subcategories" (Strauss and Corbin, 1990:97). This exercise reveals the relationships that have been recognised between codes and sub-codes. The main issues and sub-issues in respect of RM in water and power projects are developed through axial coding, which also involves making connections between the categories derived from the analysis. Finally, selective coding is the process of selecting the

patterns that systematically relate to other categories, and of later validating the relationships in order to produce a formal theory from the data.

Each of the interviews conducted was transcribed to best represent the dynamic nature of the conversations; and from extensive analysis of these verbatim transcripts, patterns were deduced. Each of these patterns, categories, codes and sub-codes were individually analysed manually. Figure 3.1 depicts the process of data collection and analysis.

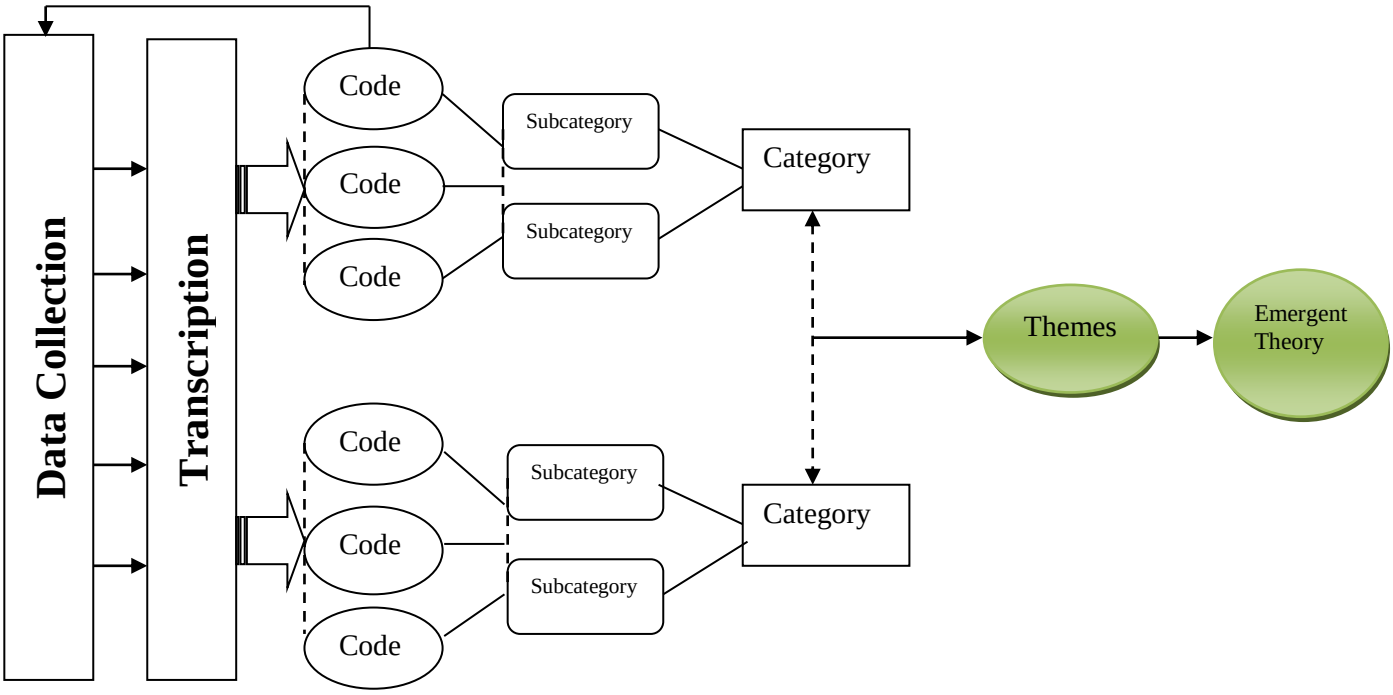


Figure 3.1: Data Collection, Analysis, and Emergent Themes

3.8.4.1 **Data Coding**

The coding process involves "*the operations by which data are broken down, conceptualised, and put together in new ways … the purposes are broader than enabling the researcher to pull out a few themes, or to develop a descriptive theoretical framework of loosely interwoven concepts*" (Strauss and Corbin, 1990:57). This process starts as soon as qualitative data

collection begins. It allows the researcher a tentative freedom to explore and select which data s/he perceives as being crucial or interesting. The initial selections of important verbatim texts are then labelled according to their potential relevance, and classified under various subject areas. Charmaz (2000:515) views coding as a process which "*helps us to gain a new perspective on our material and to focus [on] further data collection, may lead us in unforeseen direction*". Strauss and Corbin (1990:50) also noted that the rigour in this approach comes from the constant comparison of concepts and their grouping into categories that are generated from data, and this is achieved by recognising that "*data collection and data analysis is a tightly interwoven process which occurs alternately in order for it to direct the selection of samples of data*". Additionally, they assert that the employment of coding within GT is different from in quantitative research, which "*requires data to fit into preconceived standardised codes" because for a GT methodology "the researcher's interpretations of data shape his or her emergent codes*" (ibid).

The three different types of coding, already briefly mentioned, are now explained in more details.

3.8.4.2 **Open Coding**

The data analysis in a GT study begins with open coding, which "*pertains specifically to the naming and categorising of phenomena through close examination of data*" (Strauss and Corbin, 1990:63). Strauss and Corbin (1990) view open coding as a tool that allows the researcher to break through subjectivity and bias by fracturing the data and examining what has been collected in relation to his/her preconceived notions. The process requires comparing and contrasting across incidents and phenomena that emerge from the data; the data is later grouped together and given a conceptual label. This process of grouping concepts at a higher, more abstract level is called 'categorising'.

3.8.4.3 **Axial Coding**

Charmaz (2000:516) points out that Strauss and Corbin (1990) introduce new procedures in GT in the form of axial coding, which is intended to "*make researchers' emerging theories denser, more complex, and more precise*". One the data has been fractured by the use of open

coding, and the identification of categories, properties, and dimensions undertaken, axial coding serves to repackage the data by putting "*those data back together in new ways, by making connections between a category and its subcategories*" (Strauss and Corbin, 1990:97). Axial coding reveals the relationships between recognised nodes and sub-nodes, and also involves making connections between the categories derived from the analysis. The key issues and sub-issues relating to RM implementation in IWPP projects are identified through axial coding.

3.8.4.4 **Selective Coding**

The integration of all categories is achieved through selective coding, which as indicated by Strauss and Corbin (1990:81) "*is not much different from axial coding … [but] … is just done at a higher more abstract level of analysis*". This process involves the selection of a core category, or the central phenomenon that emerges from axial coding. The analogy of the sun (the core category) "*standing in orderly systematic relationships to its planets*" is made by Strauss and Corbin (1990:83). Other core categories established in the axial coding process must be related back to the core category, either directly or indirectly. Selective coding is the process of choosing the core category that is systematically related to other categories, and later validating these relationships in order to produce a formal theory arising out of the data.

3.9 Summary

This chapter has provided a detailed explanation of the research methodology employed to pursue the aim and objectives of the study. It began by introducing the possible research paradigms and philosophical approaches to adopt for the research, and having discussed these together with the various benefits and disadvantages they can bring to a study, the choice of the interpretive paradigm was made. Accordingly a qualitative approach was shown to be appropriate for the study, and especially the GT methodology was determined as the most suitable. This suitability was seen to arise from the general lack of literature concerning the exact focus of the study. Within the GT methodology, the semi-structured interview was decided upon as the best way to secure in-depth contributions from practitioners, and an indication of how the interviews were actually conducted has been provided. The attempts

made by the researcher to ensure the validity and reliability of the data gathered have been detailed, and the techniques used for analysis, according to the GT methodology, have been highlighted and fully discussed.

In the next chapter, the different aspects of the three rounds of interviewing performed by the researcher to reach the point of saturation, are illustrated. This illustration includes the results and the emergent theory from each round, and the final results. As supportive material, the practitioners' own words are provided.

CHAPTER FOUR: RESEARCH ANALYSIS AND FINDINGS

4.1 Introduction

As indicated in the previous chapter, this chapter presents and interprets the data achieved in the three rounds of interviewing. It begins by providing information about the data collection methods and research sample, and proceeds to present the data in three main parts. Part One relates to the first round of data collection, analysis, and findings; it begins by highlighting the purpose of this round, and introduces the chosen sample. The emergent data is then revealed. Parts Two and Three do the same in respect of the second and third rounds of interviewing. Summaries are offered for each part to allow the reader to consolidate the results before considering the next phase. And finally, at the end of this chapter, a summary is presented of the overall findings.

In discussing the three rounds of interviews, diagrams are included which detail the main phenomena identified in each round. These are supported by a breakdown of the various categories and sub-categories, a comprehensive account of the properties and dimensions identified, and quotes from the interviewees. These quotes are provided to demonstrate how the emergent themes are grounded in the participants' responses. Memos outlining the researcher's thoughts are also included.

4.2 Data Management

In managing the data which is important for the building of a new theory concerning the factors influencing the effective implementation of RM in IWPP projects in Saudi Arabia, diagrams are used to present the emergent ideas. Boxes and arrows are used as a means of summarising the findings, and thus depicting an emergent theory. Each box is explained using supporting data from practitioners and the literature, and the underlying theoretical arguments that provide logical linkages between propositions are considered.

The key informants in the study are practitioners whose experiences of RM implementation in water and power projects are used to form the natural foundation for the researcher's identification of the obstacles to effective RM implementation in IWPP projects in SA. Those experiences are obtained by discussions within the interviews on the issues of how risks are currently managed in water and power projects in SA, how and why implementing RM effectively is able to resolve water and power project failures, and, how projects can avoid the pitfalls associated with poor RM implementation (i.e. how RM processes can be improved).

Given that the variables in this overall situation are largely unknown, the researcher focuses on the precise context in order to determine how this affects the problem, and consequently GT is adopted, and justified as an appropriate methodology, and within this, the use of interviews is determined as far superior to any other technique.

4.3 Research Sample

Of the three rounds of semi-structured interviews conducted within the study, the first aimed to obtain a broad overview of the area being studied (i.e. WPP projects) and to identify critical junctures or significant events affecting the achievement of project objectives. The second round did much the same as the first but with the added concentration on IWPP projects, and a different population in order to gain a more diverse range of opinion that might confirm or otherwise the phenomena, categories and sub-categories identified by the first round interviewees. And the third round was intended to achieve saturation, and hence, lead to the discovery of what leads to ineffective implementation of RM in IWPP projects. In securing the interview samples, initial contacts were made via email or telephone, with individuals who were, or who had been, involved in water and power projects. At this point the purpose of the research was explained together with the kind of information required of interviewees, and a request was made for their participation. Those who consented were subsequently interviewed at a destination and time suggested by them. The participants who took part in the first round of interviews were identified from the researcher's experience and colleagues' recommendations. The interviewees for the second and third rounds of interviews were identified via the snowballing technique.

Essentially, the criterion for selection was previous or current involvement in water and power projects in SA, since the experiences, opinions, perceptions, and reflections on RM in this precise context were required. Ideally, as Glaser (1978) advised, a large number of individuals associated with the situation under study should be involved, and the researcher therefore attempted to acquire as diverse a sample as possible, as shown in Table 4.1.

Round	Government Official	Consultant	Project Promoter (SPV)	Contractor	Facilities Provider	Total
1st	2	1	2	1	1	7
2nd	2	1	2	1	1	7
3rd	2	1	2	1	1	7
Total	6	3	6	3	3	21

Table 4.1: Interviewee Demographics

Seven interviews in each round were conducted and the reason behind not expand the number of each round interview more than seven is that the researcher reached the saturation of data in round one when he interviewed the seven practitioners, also this occurs in the second and third rounds. According to Thomson (2011) the saturation occurs in data collection when no new or relevant data seem to emerge regarding a category, the category is well developed, and the relationships among categories are well established and validated. Strauss and Corbin (as cited in Thomson, 2011) stated that there is no set number for when theoretical saturation occur.

Furthermore, the saturation can be affected by many factors based on the researcher and the research. Thomson (2011) identified three factors affect the saturation of data which are as follow:

- The scope of the research questions,

- The nature or sensitivity of the phenomena, and
- The ability, experience or knowledge of researcher.

4.4 First Round of Data Collection, Analysis, and Findings

4.4.1 Purpose of the First Round

The programme for the first round of interview sessions extended over the period from 1 November 2012 to 10 December 2012, and covered a wide geographical area within SA. A broad overview of the research topic was established in this first round of interviews.

The aim was to gain a deeper understanding of the topic – essentially to learn what actually occurs in water and power projects and how risk is managed by the various players responsible for this. After beginning the interviews with a general overview, the researcher proceeded to probe more deeply to root out the causes of the problems contributing to the failure of projects to meet their objectives, and to establish what interviews felt could be done to implement RM effectively in this situation. It should be noted that whilst the emphasis was on WPP projects, it was inevitable that some interviewees would also refer to their experience in IWPP projects, and where this occurred, the discussion was allowed to continue freely.

The results of the first round of data collection provide an initial foundation for theory, and a starting point for this research.

4.4.2 Selection of Interviewees 1-7

Identifying appropriate interviewees for qualitative interviews in order to generalise is a radically different process from choosing interviewees in survey-based research, since participants are expected to provide more than simple yes/no answers (Rubin and Rubin, 1995). Hence, interviewees must be selected on the basis of their ability to engage in discussion about complicated phenomena and to do so in a multi-step processes. Participants 1 to 7, represent key informants in relevant organisations, who are thoroughly familiar with aspects of RM in water and power projects. At the suggestion of Interviewee 2, Project Promoter (SPV) participation was increased, as project promoters possess detailed information about the topic and are the main contact between all parties involved in IWPP projects. On average, the experience of interviewees 1-7 was eleven years. For reasons of confidentiality, the names of these interviewees are not disclosed (See Table 4.2).

Round	Interview NO.	Organization Role	Organization Name	Participant Position	Experience	Interview duration
1	Int.1	Government Official	SWCC	PM	10 Years	49 Min
	Int.2			Follow up and Planning Engineer	11 Years	55.4 Min
	Int.3	Consultant	Fichtiner company	Site Engineer	9 Years	39.3 Min
	Int.4	Project Promoters (SPV)	SWEC	PM	14 Years	65.5 Min
	Int.5		SqWEC	Executive Engineer	9 Years	53 Min
	Int.6	Contractor	Doosan Heavy Industries	Assistant Manager	16 Years	44 Min
	Int.7	Facilities Provider	Marafiq company	Operational Manager	11 Years	41 Min
	Total					347.2 Min

Table 4.2: Details of First Round Interviewees

The interviewees appearing in Table 4.2 provided a broad overview of the area under study, and allowed for emergent theory to be generated. In this first round of interviews, it was considered important by the research to establish a good rapport and efforts were made to assure this. The taped conversations of interviews 1-7 lasted, on average, forty-nine minutes. It is worth noting that the management teams of all the organisations involved were willing to

co-operate with the researcher in order to find solutions for current problems, but due to time constraints, there was limited participation from each party.

4.4.3 Emergent Grounded Data from Round One (Interviews 1-7)

The following phenomena were identified and explored: lack of awareness, risk factors, operation and support. All phenomena and their features emerging from the analysis of the grounded data gathered in the first round are illustrated in Figure 4.1.

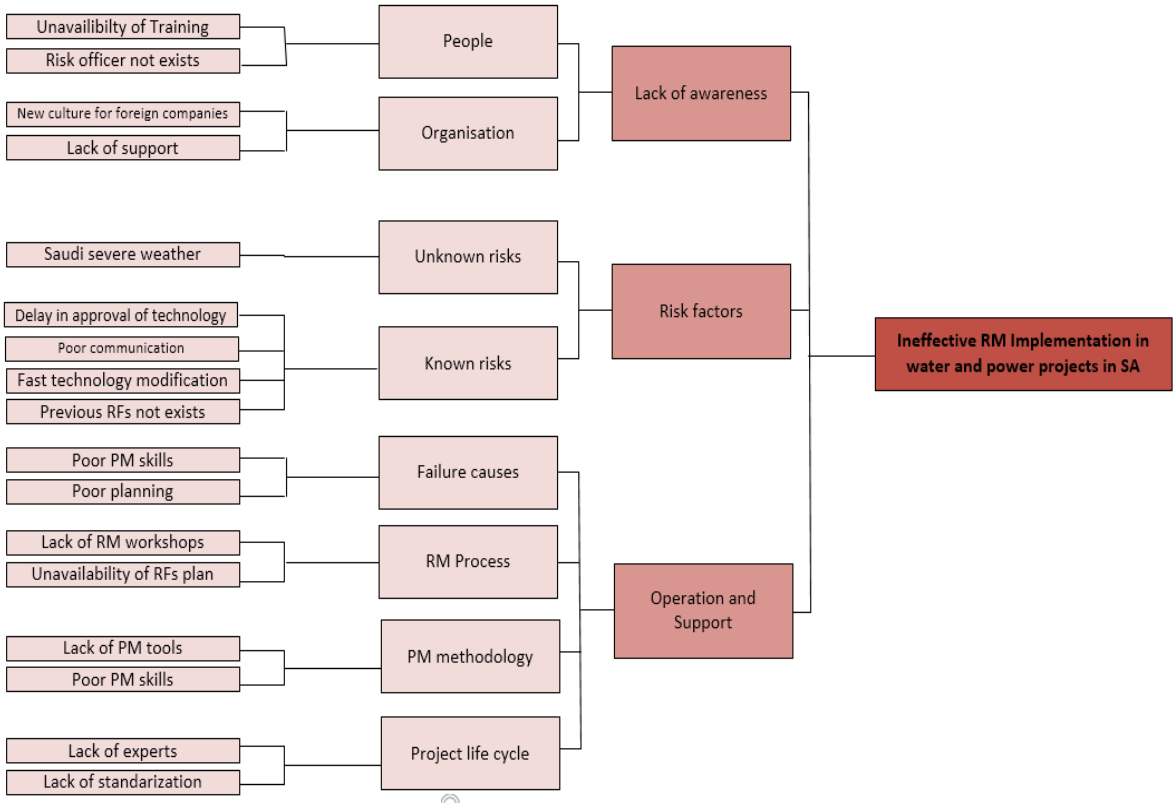


Figure 4.1: 1st Round Emergent Themes

Each of the phenomena, categories and sub-categories are individually described in the following section, along with quotes from the participants to show how the data was grounded, what suggestions were made to the researcher, and an explanation of the way the data emerged and its relation to RM implementation in water and power projects in SA.

Phenomenon 1: Lack of Awareness

Risk management is a crucial topic, and a concern that is always present in water and power plant projects. One of the main causes of failure to achieve project goals is inadequate knowledge of RM. The significance of awareness was an emerging pattern that was reinforced by the comments of Interviewee 2, who said:

> *"Recently most Saudi organisations start putting a lot of effort into increasing staff awareness with regards to risk management. Moreover, to be fully effective and efficient, these efforts should take place at, and be targeted to, every level of organisation – at the individual, all IWPP parties and importantly governmental officials".*

Similarly, Interviewee 5 expressed the view that there is a lack of RM awareness in this type of project, saying that: *"We realised about two years ago that without increasing the knowledge of RM for all related staff in the project, we would not be in a position of implementing RM in appropriate way".*

Confirmation of the significance of this emerging preliminary conceptual phenomenon in its own right was provided by further comments from Interviewee 7 who claimed: *"Achieving compliance begins with a RM awareness programme for all parties involved in this kind of project".*

The analysis of the data caused the two categories of: (1) people, and (2) organisation, to emerge, and within those two main categories, sub-categories concerning influences upon the implementation of RM in WPP projects also emerged. In relation to the 'people' category, the two themes of the lack of availability of training, and the absence of risk officers, were evident; whilst in respect of the category of 'organisation, the two sub-categories of the new culture brought in by foreign companies, and the lack of support, emerged. Figure 4.2 illustrates the categories and sub-categories as they emerged from the first round of practitioner interviews, and which in total, amount to a 'lack of awareness'.

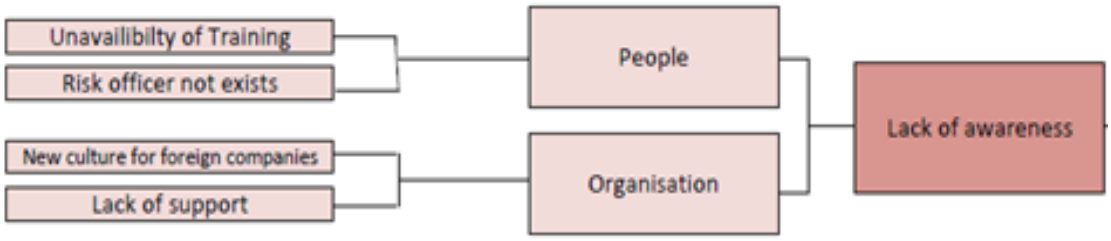


Figure 4.2: 1st Phenomenon Tree: Round One

From the first round, it was found that the above categories and sub-categories had the greatest influence on the implementation of RM in WPP projects, regarding 'lack of awareness'.

The two underlying features of 'people' and 'organisation', in this category of 'lack of awareness' were seen as major aspects of RM awareness. It should be noted that not every participant spoke about each category or sub-category of this phenomenon; it may be that some did not see any of these categories as relevant. The two categories of 'lack of awareness', and their sub-categories are detailed below:

Category 1 - People

In the context of RM implementation in WPP projects, 'people' describes the people involved in the project who are responsible for managing risks in a direct or indirect way. These people are considered as significant individuals within the projects, and a viewpoint expressed was that more concentration should be placed on them. Interviewee 2 said *"A lot of effort in increasing the staff awareness with regards to risk management should take place for the individual who deals with it"*, and Interviewee 1 said *"All specialist staff should get full awareness and knowledge of risk management,"* thereby confirming the perceived importance of increasing specialists' knowledge of RM within WPP projects. Interviewee 2 further pointed out that *"All staff must accept the management of risk as one of their fundamental duties, as risks should not be ignored".*

This category consists of two sub-categories: training, and the need for risk officers.

Training (1.1)

Individuals who are involved in training in WPP projects play an important role in ensuring the effectiveness of RM implementation, as training is the foundation required for raising awareness. Given that WPP projects encounter many risks, the employers involved in these projects should schedule training programmes in order to ensure that project needs in respect of awareness are met.

Commenting on this issue, Interviewee 6 said: *"Training related people will not only help in achieving the project goals and improve their skills, but also will raise the organisation awareness in order to reach the ideal RM implementation";* and Interviewee 2 supported this view, saying *"ongoing training in RM is important for all professionals working in WPP"*.

The ability of an organisation to make use of experts in RM in WPP projects was further emphasised by Interviewee 1 who said: *"I think that the capability of an organisation to call its RM experts to teach other employees is important"*. Seminars and courses within water and power organisations can be seen in such countries where there is a concentration on increasing the knowledge of RM. Additional confirmation of the importance of this aspect comes from Interviewee 3 who said: *"The training of people in any WPP party involved in the project can complement these efforts and thus help to ensure achieving the effectiveness of RM implementation".*

It is clear from the practitioners' statements that one of the main reasons why RM is not implemented effectively is the lack of staff training. Therefore, one can argue with confidence that RM must be supported by training programmes for the relevant individuals, for example supervisors, managers, directors, and executives.

Risk Officer (1.2)

Professionals and experts in water and power organisations consider the appointment of a risk

officer to be an important and essential step, since this provides an individual whose specific job it is to help the integration of RM within the organisational culture. The duties of a risk officer are generally: to report to the executive management of an organisation; to be a senior executive officer with knowledge of RM; to have the vision, drive and determination to lead; and, to possess the authority, responsibility and support to make things happen.

The lack of RM experts in Saudi Arabia is the reason why projects are embarked upon without assigning a risk officer. This is clear from the comments of Interviewee 7, who pointed out that:

> *"Saudi water and power organisations have a huge problem, which is not appointing a risk officer or monitors in water and power plant projects. If you ask any responsible people in the organisation about the risk officer, I am sure you will not find any answer".*

The risk officer plays a crucial role in a project, as this individual is responsible for driving RM awareness, integration, policies, and strategies.

Interviewee 4 also indicated that the risk officer is able to demonstrate to executive management how RM helps to meet project objectives and targets. In instances where there is no risk officer, there is a comparable lack of awareness of RM techniques, practices, and processes.

Category 2 - Organisation

As described earlier, Saudi water and power organisations realise that raising the awareness of RM in related organisations is critical*, "… to be fully effective and efficient, these efforts should take place at … all WPP parties and, importantly, governmental officials"* (Interviewee 2). Currently, a lack of organisational awareness affects project performance, as was articulated by Interviewee 7, who said: *"I would say that all firms of water and power need to set up a strategy to treat the lack of awareness… If they can't come up with a clear plan for solving the awareness problem they could continuing achieving negative results in the project"*.

Foreign Companies (2.1)

There are few local companies operating within the Saudi Arabian water and power industry, and the government has no option but to invite foreign enterprises to bid for involvement in WPP projects as contractors, project promoters (SPV), and consultants. These companies find it difficult to deal with the Saudi culture, and hence, they merge with small local companies that are not specialists, but which can provide some guidance in operating within the cultural confines. The Saudi government facilitates foreign companies' efforts to overcome the difficulties associated with the culture, in order to encourage their continued participation in these projects; but it is essential for the government to instil a culture in which greater attention to RM, since this would serve to inform foreign investors of the full range of risks that can potentially surface in a project. Clearly, this situation cannot be achieved until the government focuses on raising RM awareness in all parties to such projects, including local companies, government officials, and other related individuals and agencies. Interviewee 5 confirms this need, saying: *"Increased awareness of RM and appropriate risk procedure applied can encourage foreign companies to enter the Saudi industry"*.

Obviously, all foreign companies engaging with the Saudi industry should be aware of all the risks involved in any project, and the process of implementing RM in Saudi industry should be outlined and made clear to them. Interviewee 6 expressed this view, saying: *"the key to successful RM implementation is to ensure all parties have a high level of RM awareness, especially foreign companies who are new to the Saudi industry"*. Interviewee 1 also confirmed this, and argued that effective RM implementation was based on a high level of RM awareness at all levels of the organisation, and among all parties involved in such projects.

Lack of Support (2.2)

One of the main reasons for not implementing RM effectively emerged as the lack of support provided by the organisation. Risk management specialists within organisations cannot

operate efficiently if they are not empowered to settle problems that arise, or to construct RM operating procedures designed to improve the effectiveness of RM implementation. On this issue, Interviewee 4 commented: *"Appropriate risk support to related people should be adopted to reach the targeted level of RM awareness"*. This would enable greater initiative on the part of employees to overcome risks affecting projects, and thereby promote more effective RM implementation.

The role of senior management was stressed by Interviewee 2 in the comment *"By now you should understand that effective RM implementation needs more and more support from the top management"*. It is clear that without support from the higher echelons of the organisation, RM implementation will flounder as there will be no person or group responsible for this and hence, no control over how much attention is actually paid to risk.

Phenomenon 2: Risk Factors

The emergent data also shows that some critical practical risk factors were identified by practitioners, the awareness of which must be raised among the relevant people. Interviewee 1 highlighted this, saying: *"Some important risk factors you only know them from people who work on the project and they are capable to summaries to you all details about it"*. And this sentiment was echoed by Interviewees 2, 3, and 6.

These factors help to increase the knowledge and understanding of RM, which in turn will raise awareness. Interviewee 4 confirmed this, and provided the following example:

> *"I can tell you one or two crucial risk factors specific to IWPP that cannot be found in the literature, such as the complicated interface between the water and power plant project and the pipeline system project, the co-ordination between these two projects needs a high level of communication".*

From this comment it is apparent that there is a definite gap in the research literature, but not a surprising one, since the application of the IWPP approach is new in SA, and consequently, knowledge of these risk factors is notably absent. Nonetheless, it is essential for each party to

the process to possess an understanding of the nature of these. Yet, it is difficult to address all the risk factors within the scope of this research, so the focus will be on those practical factors which are critical. Although there are many different classifications of risk factors, practitioners agree on two broad types, these being: unknown risks and known risks.

Figure 4.3 illustrates the categories and sub-categories of the second phenomenon 'Risk factors' affecting the implementation of RM in water and power projects. In the categories of unknown, and known risks, five sub-categories emerged. In the unknown risk sub-category, the factor of the severity of the Saudi weather was noted, and in the known risk sub-category, the four factors of: delay in approval of chosen technology; poor communication; fast technology modification, and a lack of previous risk factors from which to learn were identified.

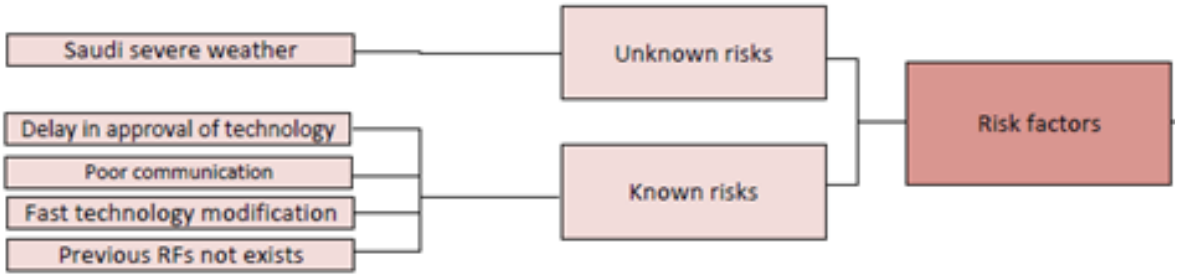


Figure 4.3: 2nd Phenomenon Tree: Round One

Category 3 - Unknown Risks

Although by nature, it is difficult to identify unknown risks, the main causes of these risks should be well known. In this regard, practitioners agreed that *"past WPP and IWPP projects that have delays or are over budget on the project output show one of the reasons behind this failure is a number of unknown risk factors"* (Interviewee 3). The influence of these factors clearly affects project outcomes, so considering them in advance may contribute to raising awareness of RM.

Severe Weather (3.1)

Severe weather in SA is the only sub-category under the unknown risk feature, but is considered by practitioners to be a very important one, since it leads to a loss of control during the project phases. Practitioners commented on the different weather conditions, such as sandstorms, and temperatures reaching above 50˚C, and indicated their belief that all IWPP parties, particularly foreign companies, become aware of these likelihoods and consider the potential for weather conditions to be problematic, in their delivery planning. This is confirmed by Interviewee 6, who relayed his experience with a new foreign company in the Saudi industry, saying *"a delay happened at the execution phase in Jubail plant due to some sandstorms within the project area, which suspended the project for 45 days".* Interviewee 6 further confirmed the importance of this factor saying: *"scheduling the tasks based on the weather will avoid many work stoppages"*.

Category 4 - Known Risks

Among the known risks, practitioners were able to identify four different practical risk factors that, if not considered, would prevent the achievement of project goals. Interviewee 2, for example, emphasised the relationship between knowledge of risk factors and the attainment of project objectives, saying: *"Knowing the practical risk factors that the Saudi water and power plant projects face will help not only to meet the projects objectives, but also it will increase the knowledge for related people"*.

The four sub-categories were identified as: approval delay, poor communication, fast technology modification, and, lack of practical RFs.

Approval Delay (4.1)

As the water and power services are supported by the public sector, a related administrative sub-category emerged as a known risk factor leads to project delay. Interviewee 4, for

example, pinpointed the problem, saying: *"Government officials must grant the approval for the main things in the project; unfortunately this approval, such as design, change order and also signing the contracts, takes a long time which causes delay to the project".*

Delays in approval over and above the anticipated delay (which is planned for) mean that individual activities are delayed, and these small delays have a knock-on effect elsewhere, putting the entire project out of kilter. However, where tight timescales must be adhered to, there is no room for projects to be extended. Hence, it can be appreciated that the speedy participation of government officials is an important element in IWPP projects, and that the timescales in the approval process should be reduced in order to facilitate on-time completion of projects.

Poor Communication (4.2)

Communication emerges as an important sub-category of known risk factors, and where this is poor, there is an inevitable loss of control over the project. Interviewees 2 and 7 both state that *"communication is key in such complicated projects".* Consequently, WPP project members should ensure that a clear and effective communication plan is devised and that all parties are aware of it. Interviewee 5 emphasised this requirements, saying *"a communication plan with all parties must be agreed and followed".* And Interviewee 4 gave an example of a real problem as an outcome of poor communication, saying *"... the complicated interface between the water and power plant project and the pipeline system project; the co-ordination between these two projects needs a high level of communication ... A miscommunication in this matter has led to four months' delay and overrun costs in the Shuaiba 3 project".*

Fast Technology Modification (4.3)

The water and power industries have experienced, rapid and continuing technological change. Indeed, change is a certainty given the developments in types of technology, materials, tools,

and desalination methods. During the preparation of the project specification, design, and execution, improvements in technology call for amendments to the plan. Interviewee 1 commented on this, saying: *"Although it will cost more and affect the schedule, we must continue to manage change with respect to design and everything else"*.

This sub-category has a significant impact on projects with respect to cost, time, and quality. Practitioners believed that the adaptation to new technologies might be improved by the introduction of standard processes that could be followed when change was necessary. In particular Interviewee 4 said that *"the changing of technology may be faster, if the related people fix a standard process that helped in the continual face of change driven by new technology".*

Lack of Previous RFs from which to Learn (4.4)

Water and power projects are challenging, and consequently it is beneficial to reflect on previous experience and to learn from mistakes made, and indeed from practices that brought success. In this respect, Interviewee 7 said: *"If we evaluate and analyse the previous projects and then record every single risk identified, it will improve the efficiency in future projects and raise the RM knowledge of all parties"*.

The identification and recording of all risk factors is important, and none should be omitted, as argued by Interviewee 3, when he said: *"... all recorded risks must be available to related people in any new project"*. A similar view was expressed by Interviewee 5, who said: *"After completion of the risk identification, a register of all identified risks is established, to help the current and future projects".*

In the current Saudi water and power industries there is a lack of information on this aspect, and coupled with the fact that some of the water and power risk factors are critical and repeatable, it is of extreme importance that known risks from previous projects should be considered at the start of every new one.

Phenomenon 3: Operation and Support

The third phenomenon emerging from the data acquired from practitioners in the first round of interviews is labelled 'Operation and Support', and describes the whole process of RM, PM methodology, the causes of failure, and the project life cycle. All these categories require operation and support from within the project, since *"... too often, projects fail because they do not get enough support from the organisation and related people who are affected by and involved in the project"* (Interviewee 4).

Fig. 4.4 illustrates the categories and sub-categories of the third phenomenon affecting the implementation of RM in WPP projects: operation and support. From the data analysis, the following categories emerged: (5) causes of failure; (6) RM process; (7) PM methodology; and (8) project life cycle. In the category of causes of failure, the themes of poor PM skills, and poor planning are included; the RM process includes the themes of lack of RM workshops, and unavailability of RFs plan; the PM methodology category covers a lack of PM tools, and poor PM skills; and, finally, the project life cycle category includes the sub-categories of lack of experts, and lack of standardisation. It was found that the above categories and sub-categories were the most influential in causing the ineffectiveness of RM implementation in WPP projects according to the 'operation and support' phenomenon.

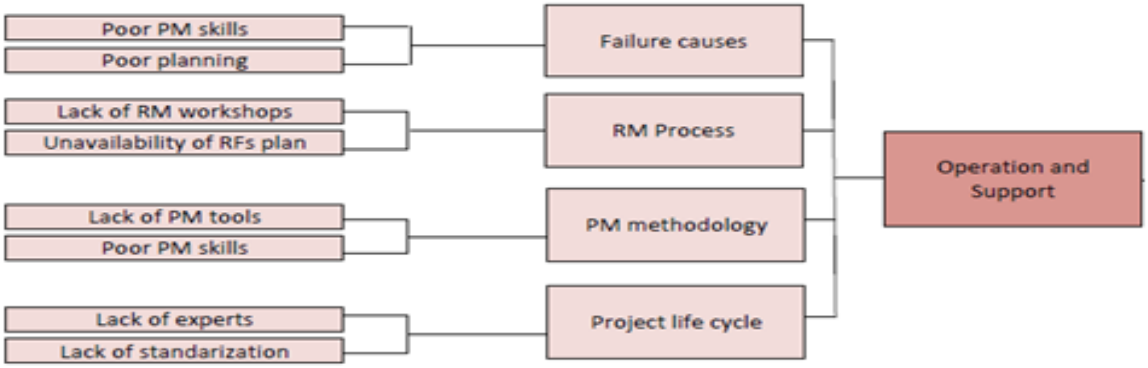


Figure 4.4: 3rd Phenomenon Tree: Round One

Category 5 - Causes of Failure

The identification of the category of different causes of failure arising in WPP projects requires that practitioners first identify these causes and then apply different types of actions, and in this respect the causes highlighted are poor PM skills, and poor planning.

Poor PM skills (5.1)

In raising the issue of poor PM skills, Interviewee 2 said: *"Mismanagement in the project often means the project takes much longer than planned, and costs more than budgeted. This is due to the poor skills of the project managers"*. And Interviewee 1 echoed these beliefs, saying: *"Most people do not fully know that failures to meet project objectives are not only due to poor risk management but also poor fundamental project management skills"*. Interviewee 7 was also critical of project managers who did not possess the requisite skills. In his view, *"If there is a project manager with poor skills, you will know him if he gets surprised when he becomes aware that the cost of the project will increase and there will be an overrun in the schedule"* (Interviewee 7).

Undoubtedly, therefore, water and power organisations should pay greater attention when appointing the PM in order to avoid such failures. Interviewee 4 was adamant in this respect, saying: "*To ensure PMs practise good project management fundamentals, the organisation must give them sufficient training in the fundamentals … it must cover project planning, execution and control, and also focus on the practical understanding of the concepts"*.

Hence, it is clear that poor PM skills represent a major cause of failure in WPP projects, and that organisations must appoint experts in the field if they are to add value to the project.

Poor Planning (5.2)

As WPP projects are considered to be large and complicated undertakings, an accurate plan of action throughout the lifetime of the project must be created and properly followed. This plan should show what needs to be done, by whom, and when. Interviewees 1 and 3 both commented that the project plan should be reviewed several times to ensure that it addresses all the risks and contains no activities that will cause a project to fail.

Planning skills, are therefore, essential on the part of all those involved since inadequacies in this respect will precipitate serious project failures. The practitioners interviewed believed that all PMs should spend sufficient time on defining the project objectives, scope, risks, and budget well before any actual work on the project commences. Interviewee 5 particularly expressed this view when he said *"difficulties will be faced in managing the project scope effectively throughout the project".* Furthermore, Interviewee 1 said: *"Water and power plant projects are very big, so it is important to plan the project formally and explicitly".*

It is also important to note that poor planning does not only bring immediate problems, but can lead to serious difficulties in many different areas later on in a project as the knock-on effects ripple across the various elements of work. For example, poor estimates may not cause problems until much later when the budget runs out and delays ensue, and the outcome of these occurrences may not become evident until the eventual project completion when the overall quality of the project is evaluated as less than expected.

Category 6 - RM Process

In the Saudi water and power industries, practitioners confirm that RM is implemented in an informal way, which means it does not follow the standard process. Consequently, there is a loss of control of the potential hazards. The formal identification of RM processes that will be effective in these projects is, therefore, essential as this helps all parties to control the project scope and increase RM knowledge. The interviewees in the first round of data gathering classified this influencing factor into two sub-categories, these being the lack of RM workshops, and the absence of RM plans.

Lack of RM Workshops (6.1)

It is known that the provision of frequent RM workshops for those involved with WPP projects increases the chance of project success, especially if those workshops are mounted at recognised milestones. Risk management workshops consist of three aspects: the identification of each risk to which the project is subject, the estimation of these risks with regard to their probability and impact; and the evaluation of these risks. Key personnel should

attend all risk workshops, but these are not usually offered, as indicated by Interviewee 1, who said: *"Although risk workshops add value to the project, since I started work in this kind of project I have not attended one"*. This comment confirms, as stated earlier, that the Saudi industry does not formally implement RM, which is one of the main reasons why these projects fail to meet their objectives.

Lack of RM Plans (6.2)

A well-developed RM plan is crucial in any project, but particularly so in WPP projects as these are complex and have a number of unique risk factors. Interviewee 2 acknowledged the need for this type of plan but complained that in the context of SA, such planning did not occur. In this respect, he said: *"Yes, we know developing an effective RM plan plays an important role in any project, but unfortunately, in SA it is not developed"*.

Without a well-formulated RM plan, small issues can have a great impact on a project.

Category 7 - PM Methodology

It is necessary for WPP organisations to establish and follow proper PM procedures, as these projects are large and complicated as has already been stated. In circumstances where a clear methodology is in place, the entire activities associated with the project can be effectively and smoothly managed, as noted by Interviewee 2, who pointed to the need to control these projects, when he said: *"Managing the scope of the project, risks, the work plan, etc., needs a special procedure in order to have full control over them"*.

On the aspect of increasing RM knowledge, the practitioners who participated in the first round of interviews divided this feature into two sub-categories, these being: lack of PM tools, and poor PM skills.

Lack of PM Tools (7.1)

Project management tools are extremely important and help with each step of the process, as well as helping to solve PM issues. Interviewee 7 made the point, however, that practitioners

themselves are not involved in decisions about which tools to use, and he advocated for changes in this respect, when he said: *"In this organisation, the top management choose the tools without taking ideas from the practitioners who are working on them; this will lead them to not use them. It is important to choose the tools wisely, and ensure the related people in the project are comfortable when they use them"*.

The methodological tools available to project managers are valuable in guiding their effective management of a project from start to completion, and especially for complex projects, it is sensible to ensure that these are used and that project managers feel comfortable doing this.

Poor PM Skills (7.2)

As just mentioned, project managers need to feel comfortable in their use of PM methodology. Hence, project managers should be appointed on the basis of their expertise in managing projects, and their knowledge of PM tools. Only a project manager who meets these criteria is able to ensure that all individuals working on the project receive appropriate guidance. Unfortunately, there is a shortage of PM experts, as explained by Interviewee 2, who said: "*In the Saudi water and power industry, we are facing a shortage of experts who can manage these projects according to a professional method; current PMs need sufficient training in order to improve their PM skills".*

This reference to professionalism was taken up by Interviewee 4, who said: *"One important thing is to deliver management reports on a routine basis, in order to reflect the accurate status of the project and allow management to verify that good project management practices are being followed"*.

A further important issue, raised by Interviewee 7, was poor communication skills among project managers. He made the point that *"Some project managers do not understand how to communicate well, which will cause difficulties in achieving the project objectives"*.

Hence, it can be understood that each project manager should follow the appropriate project management methodology that has been assigned to ensure the project's smooth operation, and that this should be done in a systematic and professional way.

Over and above the level of the PM, however, senior management must support the practice of project management, and this entails much more on the part of management than one might initially suspect, as it involves acquiring a working knowledge of PM fundamentals, so that there is a familiarity with the PM's language. It also means allowing PMs the time to do their jobs correctly, not asking them to take shortcuts, or to disregard aspects of the methodology, and empowering them with the authority to settle problems swiftly without having to refer back to a more senior manager.

Category 8 - Project Life Cycle

The PM is responsible for the project throughout its entire life cycle. This encompasses: planning, execution, building and managing project teams, reporting to the project sponsor, ensuring quality control, and evaluating the project. These are all key aspects of the project manager position. Interviewee 3 stressed the need for the PM to be constantly alert to the potential for problems, saying: "*In the project's life cycle it is necessary to continuously identify causes that may have a detrimental effect on the project, analyse their possible adverse consequences and prepare a response to them"*.

This feature was divided into two sub-categories by the interviewees in the first round, these being: lack of experts, and lack of standardisation.

Lack of Experts (8.1)

In the Saudi WPP industry, projects face the problem of a shortage of expertise, as indicated by Interviewee 1 who expressed this limitation, saying *"we do not have people who are aware of problem solving principles in water and power plant projects"*. And Interviewee 3 stressed the need in this respect, when he said: *"A person who has experience in water and power plant projects is really needed, as he can provide valuable understanding to a project"*. Hence, it can be appreciated that the practitioners believe in the critical role played by experts in identifying, defining, and solving problems using professional methods, and that without such expertise projects flounder.

Such experts are regarded as also being capable of acting as trainers, peer-reviewers,

approvers, and knowledge-sharers. Clearly, they are seen as necessary to maximise effectiveness and productivity, and by implication, output.

Lack of Standardisation (8.2)

IWPP projects consist of different organisations that work together on a daily basis. Therefore, the adoption of RM standards that are shared across these organisations will assist all parties in their efforts to manage risk successfully. However, Interviewee 7 notes that: "*There is no RM standard applied in IWPP projects in SA, if an organisation adopts a standard, it will use what is appropriate for it only. Take into consideration that most water and power organisations do not apply any RM standard"*.

Project managers must be able to follow a standard methodology that is sufficiently detailed to provide a routine that can help overcome the poor project management practices outlined. This methodology must be used throughout the project lifecycle.

4.4.4 Summary

From the analysis of the data collected from practitioners in the first round of interviews, it was possible to establish the initial conceptual foundations, and the starting point for the eventual generation of theory. The data collected in this round represents rich information from which a clear understanding of the state of RM in WPP projects, the types of problems this precipitates, and how an ideal RM strategy might be effectively implemented.

The main outcomes from the first round of data collection can be summarised as:

1. The emergence of an initial conceptual account from the grounded data, in which phenomena, categories, and sub-categories of factors were identified as contributing to ineffective RM implementation in WPP projects in Saudi Arabia.

2. The identification of some crucial practical risk factors specific to WPP projects that negatively impact upon project objectives.

3. The knowledge that RM is currently implemented in WPP projects in an informal, rather than systematic and methodical manner.

4. The agreement among practitioners that the effective implementation of RM would resolve the problems that combine to cause failure in WPP projects, and hence, assist in meeting project objectives.

5. The fact that SA suffers from a lack of knowledge and experience in dealing with RM.

6. The fact that there is a lack of RM training for staff across all project parties.

7. The critical need to provide appropriate RM resources, training, and awareness programmes for staff in an effort to build an organisational culture that appreciates risk and focuses on managing them effectively.

8. The need to ensure RM awareness among all project participants.

Clearly, from this summary it can be understood that practitioners recognise the need to raise awareness of risk associated with IWPP projects which are becoming more common in SA. They certainly believe there is a need to manage risks throughout the lifecyle of such projects, and that all parties involved have an equal obligation to be aware of the whole range of potential risks, their likely impact on a project if not managed, and how to ensure they are managed. The identification, treatment, and monitoring of these risks is considered to be a shared responsibility between of all IWPP parties.

4.4.5 Implications for Further Work Arising from Round One

As a result of the first round of interviews, the researcher has developed a propositional diagram that is fully grounded in practitioners' experiences, and which consists of the phenomena identified as contributing towards the ineffective RM implementation in WPP projects in SA, together with categories, and sub-categories of factors within those phenomena.

The identification of these risk factors is valuable as a foundation from which to begin further in-depth investigation. However, it is clear that such additional work is demanded since there is a need to consult with more experienced personnel, for the factors identified to be confirmed by other experts, and to probe some of the factors in more detail.

For example, although practitioners in the first round of interviews indicated planning as a sub-category affecting the implementation of RM, the researcher did not focus on planning from all possible angles. Therefore, the planning aspect can be investigated further, across all IWPP parties. Secondly, the tentative theory emerging from the first round of interviews was the outcome of contributions by practitioners who work in different organisations, each one with its own role. Hence, further investigation is needed to confirm the phenomena, categories, and sub-categories by individuals in different organisations. Thirdly, it is necessary to begin to address the relationships between the sub-categories and categories of the phenomena identified.

Consequently, additional data collection and analysis is indicated in order to achieve a greater focus on IWPP projects, and to investigate the specific potential risks associated with the approach. It is acknowledged that the phenomena, and the proposed categories and sub-categories will not be constant, and that a need will most surely arise to amend the categories and sub-categories, and perhaps even the phenomena.

4.5 Second Round of Data Collection, Analysis, and Findings

4.5.1 Purpose of this Round

The programme for the second round of interview sessions extended over the period 1 January to 4 February 2013, again involving a geographical spread throughout SA. As indicated in the previous section, the first round of interviews set the platform for a more in-depth investigation of the causes of WPP projects' failure to meet objectives, and the way in which effective RM implementation can contribute towards preventing such failures. Hence, the second round of interviews represented a logical progression in the study, designed to promote a greater concentration on the IWPP approach, in contrast to the first round which had focused on WPP projects, due to the longer experience of these in SA. Additionally, it served to introduce more diversity into the sample, with the aim of exploring the level of generalisation of the data being obtained

The results of this second round of interviews are presented in a propositional diagram, which summarises the theory as its development progresses. As with the propositional diagram constructed after the first round of interviews, each component of the diagram is explained through the use of supporting data from the interviewees and the literature.

4.5.2 Selection of Interviewees 8-14

Clearly, the indications for further study, and the consequent purpose of the second round of interviews, dictated the need for an additional purposive sample as a means of increasing the diversity of response. Hence, a second set of practitioners to expand the data and further strengthen that already obtained was sought. These practitioners were identified via the snowballing technique, whereby names are obtained through the recommendations of previous interviewees. This process led to the interview sessions conducted with Interviewees 8 to 14 (See Table 4.3).

Round	Interview NO.	Organization Role	Organization Name	Participant Position	Experience	Interview duration
2	Int.8	Government Official	SWCC	Engineering Dep. Manager	22 Years	76.8 Min
	Int.9			PM	17 Years	61 Min
	Int.10	Consultant	ILF company	PM	18 Years	47 Min
	Int.11	Project Promoters (SPV)	SWEC	PM	18 Years	50.3 Min
	Int.12		SqWEC	PM	9 Years	59 Min
	Int.13	Contractor	Mitsubishi Heavy Industries	Site Manager	16 Years	45.8 Min
	Int.14	Facilities Provider	SqWEC	Operational Manager	20 Years	71 Min
	Total					410.9 Min

Table 4.3: Details of Second Round Interviewees

This group of interviewees (8-14), secured via the snowballing technique, provided the research sample with whom to investigate the emergent theory in greater depth. All conversations were tape-recorded, and lasted on average, fifty-nine minutes.

4.5.3 Emergent Grounded Data from Round Two (Interviews 8-14)

The analysis performed in relation to the second round interviews explored the same areas identified earlier as having a negative impact upon RM implementation in WPP projects in SA, but more specifically, practitioners were asked to consider IWPP projects. It was revealed in the analysis that the first round findings were indeed confirmed. However, additional factors emerged which are now included in the re-drafted model provided as Figure 4.5.

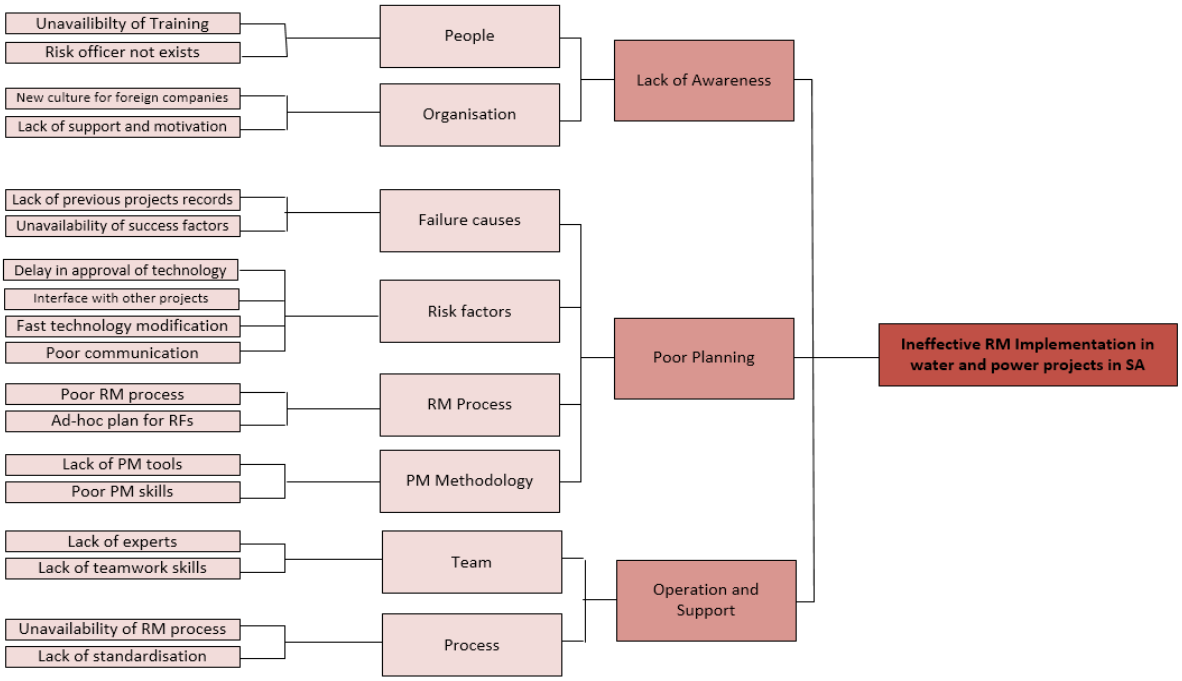


Figure 4.5: 2nd Round Emergent Themes

In the discussion which follows only the new data is discussed.

Phenomenon 1: Lack of Awareness

The second round interviewees agreed with their predecessors that awareness represents the first step towards achieving effective RM implementation in IWPP projects in SA. Indeed, Interviewees 9, 10, 12 and 14 perceived awareness of RM as playing a crucial role in this kind of project. (See Figure 4.6).

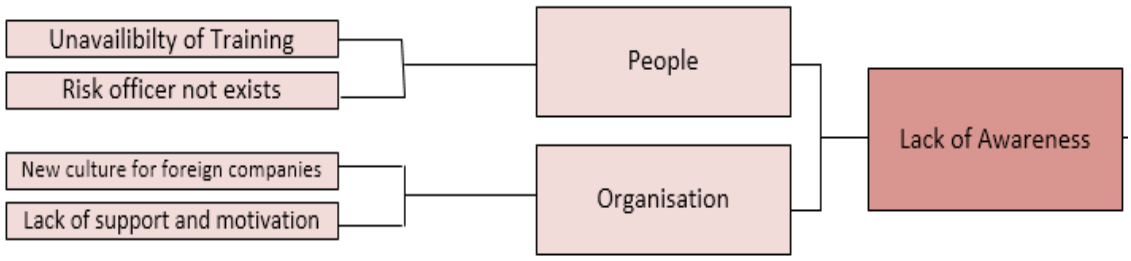


Figure 4.6: 1st Phenomenon Tree: Round Two

All the features and sub-categories identified in the first round as being related to this phenomenon were confirmed. In addition, however, Interviewee 9 offered a slight development of the sub-category 'lack of support', saying: *"motivating people with support to get the full knowledge of risk management will raise the productivity of these projects"*. And when other interviewees in this round were asked about this addition, they agreed on the need to include a motivational aspect in the expectation of the organisation, since this was perceived as being part and parcel of the overall support that should be provided by employers to the workforce. Without such attempts to motivate individuals through the provision of support, RM implementation in IWPP projects within the Kingdom will remain ineffective.

Phenomenon 2: Poor Planning

Practitioners in the second round also confirmed the beliefs of their predecessors, emphasising the crucial role played by planning in increasing efficiency and achieving project goals. Consequently, it was considered for an accurate plan for each project to be formulated. In particular Interviewees 8, 9, 11, 12 and 14 gave the opinion that inadequate project planning leads to failure, and that this had actually been the case with most of the failed projects in SA. The comment from Interviewee 8 that *"One of the most important causes for delaying water and power projects is insufficient planning"* was echoed by the other interviewees, thereby confirming that planning with all its various aspects is a major and relevant category for the study.

It also emerged in the second round of interviews, that some of the features established in the first round as belonging to the third phenomenon, should in fact be considered as part of the phenomenon of poor planning, since Causes of failure PM process, and PM Methodology, were all believed by these interviewees to be part of the planning phenomenon. Indeed, they also expressed the need to include Risk factors in this phenomenon as these must be outlined at the planning phase.

Consequently, this phenomenon now describes the whole RM process as it embodies PM methodology, causes of failure, and risk factors. All of these categories require there to be a

logical and realistic plan to be constructed before any work is commenced, as confirmed by Interviewee 14, who said: *"Water and power projects fail because they do not get enough time in creating the plan"*.

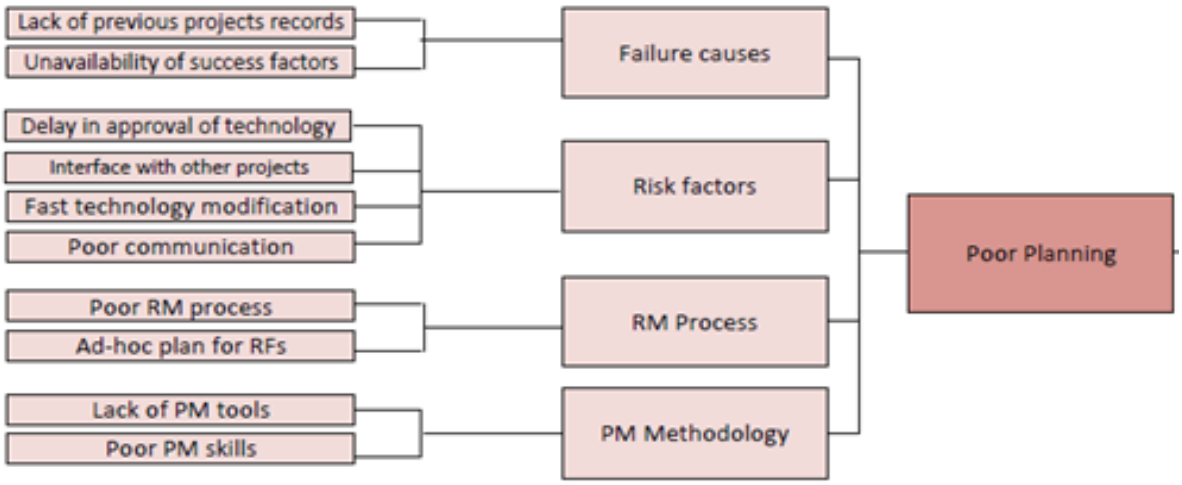


Figure 4.7: 2nd Phenomenon Tree: Round Two

Figure 4.7 illustrates the advancement to the categories and sub-categories of the second phenomenon with the aid of practitioners. This progression led to the categories taking the following shape: (3) Causes of failure; (4) Risk factors; (5) RM process; and (6) PM methodology. Within these main categories, the number of sub-categories varied. In Causes of failure, the absence of records relating to previous projects, and insufficient success factors, emerged; within the RM process, poor RM process, and the absence of any RF plan were commonly cited; the PM methodology sub-categories include a lack of PM tools, and poor PM skills; and finally, the sub-categories of the Risk factors are delay in approval of technology, interface with other projects, fast technology modification, and poor communication. These categories emerged as exerting the greatest influence on the potential for RM implementation in IWPP projects to be successful regards to the phenomenon of Poor Planning.

Category 3 - Causes of Failure

As explained in the first round of interviews, it is not enough to identify the causes of failure in WPP projects. Rather, the events precipitating those causes must be traced back to their origins, and simultaneously, previous projects should be scrutinised to determine similarities in failure patterns. Interviewee 12 referred to the need for research in this respect, saying "*In any project, it is necessary to identify and study the causes of failure in previous projects in order not to repeat the failure"*.

In this respect, the second round practitioners provided discussions which prompted the researcher to re-classify the causes of failure into the two sub-categories of: lack of previous project records, and unavailability of success factors.

Lack of Previous Project Records (3.1)

Despite the fact that several WPP projects have been undertaken by the Saudi Arabian government, no records of their progress are available, which is a definite shortcoming, as noted by Interviewee 10 who said: *"We do not have a process to record all the problems or success factors, or even the causes of major risks in water and power plant projects; only expert people who can give you what is in their mind, so if anyone resigns or dies, we will have a lack of information"*.

There is, therefore, a need for a systematic process in which all activities within a project are automatically recorded and stored/archived, so that project managers and other project teams working on subsequent projects can reference this information, and follow the process as established. This need was echoed by Interviewees 10, 11, 12, 13 and 14.

Unavailability of Success Factors (3.2)

The absence of records leads to the loss of all potentially informative events either positive or negative, during project phases, and particularly at the commencement of a new project, practitioners feel as though they are floundering, as highlighted by Interviewee 11 who said: *"At the beginning of a new project, we would like to go through a list of recorded success factors in order to strengthen them and study their suitability for each project, but unfortunately we are missing this information and we meet difficulties right at the starting*

point".

In addition, *"each project differs from another project but in this kind of project we are in need of the common success factors to enable the related people to review them"* (Interviewee 13); hence, there is a continual feeling among practitioners that they are working in the dark, and when this exists from the start of a project, it depresses confidence among those who are responsible for project delivery.

The absence of a sound data base indicating what risks have occurred in the past and the likelihood of their emergence in future projects is thus a major contributor to poor RM implementation.

Category 4 - Risk Factors

In terms of the risk factors identified by second round interviewees, the data prompted the researcher to re-classify this feature, and to identify four sub-categories, these being: delay in approval of technology, the interface with other projects, fast technology modification, and poor communication. These were considered as crucial by practitioners, and as definite components of risk planning.

Interface with other Projects (4.2)

In the first round, Interviewee 4 mentioned this sub-category as an important one, and consequently, the researcher investigated this in depth with second round participants since no mention of this appeared in the literature. Clearly, however, this was seen as a risk factor, as noted by Interviewee 9 who stated: *"delays in some previous projects were caused by the complicated interface between projects"*. Giving an specific example of the interface problems, this interviewee added: "*the pipeline system project and the grid for the electricity project should be finished before operating the plant; in the last IWPP project the opposite happened which leads to huge loss".*

Effective co-ordination of activities among the different parties is thus a pre-requisite for on-time delivery, as identified by the practitioners. In fact, the need to address problems

associated with the interface between the various service providers has been recognised by the Saudi government by its establishment of the Study and Design Department that is charged with co-ordinating activities at the project interface, and monitoring their smooth operation.

Category 5 - RM Process

The RM process was identified in the first round as a clear category, and subsequently elevated to the Planning phenomenon after the participation of practitioners in the second round. Their feeling was that the RM process should be included in the overall planning process, and hence, considered in the early phase of any WPP project; and within this category, they highlighted the two sub-categories of: poor RM process, and ad hoc plan for RFs.

Poor RM Process (5.1)

As established via the literature and in the first round of interviews, the RM process in Saudi WPP projects is seen as informal, and this approach has many limitations. Hence, a formal, systematic process is an absolute requirement if RM knowledge is to be enhanced, and project goals are to be achieved. Interviewee 8 gave his opinion, saying: "*applying the RM process adequately will increase the performance of projects and let everyone know what is happening in the projects and what risks might face them"*. However, in order to introduce a systematic RM process, workshops are identified as the means of educating project participants, and the introduction of suitable RM tools is also required. Improvements to the process to elevate its status from that of informal, to formal, are believed to increase the chances of project success.

Ad-hoc plan for RFs (5.2)

In round one of the interviewees, practitioners agreed that a well-developed (and systematic) RM plan is a crucial requirement for any project, but particularly for WPP because of the unique risk factors which characterise them. Any failure to consider and deal with RFs in this

type of project inevitably leads to a loss of control. Interviewee 10 referred to this threat, in his recommendation that: *"Risk experts should follow a suitable process with all risk factors in order to manage and control them*". Likewise, Interviewee 14 confirmed the need for such a strategy, saying: *"an accurate plan from A to Z for each risk will help managers to control all risks smoothly"*.

Category 6 - PM Methodology

Practitioners in the second round of interviewing, offered comments which resulted in this category being re-classified into the two sub-categories of: Lack of PM tools, and Poor PM skills. Only one modification was suggested by Interviewee 9, and confirmed by other second round interviewees, that being the removal of this entire feature to the phenomenon of poor planning, on the grounds that this was an aspect that should be considered at the early stage of a project.

Phenomenon 3: Operation and Support

As in the first round of interviews, operation and support emerged, and was confirmed as an important component in the attempt to increase RM implementation in WPP projects in SA.

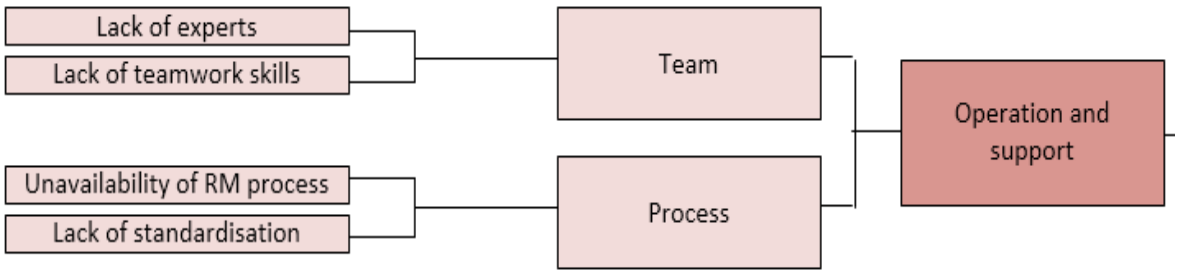


Figure 4.8: 3rd Phenomenon Tree: Round Two

Figure 4.8 illustrates the categories and sub-categories contained within the third phenomenon after its re-development. The two categories of (7) Team, and (8) Process were concluded, each having two sub-categories. In respect of Team sub-categories, these included the lack of experts, and the lack of teamwork skills; and with regard to the Process sub-categories, these

are the unavailability of any RM process, and the lack of standardisation. These categories and sub-categories were seen to exert the most influence on the effectiveness of RM implementation in WPP projects in regard to the phenomenon of Operation and support.

Category 7 - Team

Teams that are appropriately constituted and skilled are vital to the success of any project, and the need for effective teams was identified by second round practitioners, who highlighted two separate aspects in this connection, these being: the lack of experts, and the lack of teamwork skills.

Lack of Experts (7.1)

In respect of the lack of experts, this was voiced in the first round of interviews, and subsequently confirmed in the second round. Interviewee 11 emphasised this problem, saying: *"experts in water and power plant projects are missing".* Clearly, given the many references so far to the complicated nature of WPP plants, the absence of experts with the capability to impart knowledge and steer projects in what is known to be a successful direction, can only promote uncertainty and failure

Lack of Teamwork Skills (7.2)

The element of teamwork was identified in this round as worthy of separate consideration given its contribution to the success/failure of a project. Speaking of teamwork, Interviewee 13 defined this by saying: *"it is a collaborative effort by members of a project working together to achieve the project goals"*. And Interviewee 14 highlighted the fact that it is *"very difficult to complete tasks effectively when the teamwork skills do not exist"*. The value of individuals working together was also emphasised by Interviewees 9 and 12, who pointed to the benefits to be derived from pooling ideas and from individuals working collectively to identify, assess, and control risk.

Category 8 – Process

The Process category, which emerged in the first round, was confirmed my second round interviewees who agreed that this should be located in the phenomenon of Operation and support. Their view was that the existence of a standard, methodological process to underpin all activities in WPP projects would serve to support all parties in the discharge of their responsibilities as they would always be able to refer to a blueprint for operation. Two sub-categories were identified by practitioners, these being: the non-availability of a formal RM process, and the lack of standardisation.

4.5.4 Summary

The data gathered during the second round of interviews was rich in content, and useful in developing the emergent theory, as it enabled confirmation of earlier thoughts, and allowed for an extension to these as greater understanding of certain issues that arose in the first round, but were not sufficiently clear to be properly categorised. The outcome is a more developed emergent theory from the analysis of the grounded data, and which identifies all the phenomena, categories, and sub-categories that contribute towards ineffectiveness in the area of RM in WPP projects in SA.

4.5.5 Implications for Further Work

Having undertaken two rounds of interviews with practitioners in Saudi Arabia's WPP industry, the researcher has been able to define the boundaries of existing knowledge of RM in WPP and IWPP projects in the Saudi context, and to develop a set of propositional diagrams that are fully grounded in practitioners' experiences. It is appreciated, however, that the emergent theory presented thus far may not be constant, as new insights were obtained from the second round, and there may well be further insights yet to be offered. Hence, the implication of the results thus far is that there remains room for another set of interviews,

aimed at securing saturation. A further interview exercise has the potential to improve the data as new participants will bring more and possibly different experience to bear. Additionally, there is a need for the researcher to place even greater focus on the IWPP approach, such that the resultant theory pays due attention to the crucial issue of outlining the underlying theoretical arguments that apply in this context, and which provide the logical link between propositions. Consequently, an indication exists for the third round interviewees to be practitioners who definitely possess experience and knowledge of RM in IWPP projects.

This round of interviews will complement previous rounds, strengthen, confirm, and validate the data gathered, and validate the overall GT method. It may also affect the propositional diagram developed thus far, as more categories and codes may be explored. Therefore, the sample selection for the third round is directed to further the researcher's awareness and knowledge of the critical junctures, significant points, and events associated with the target issues being explored.

4.6 Third Round of Data Collection, Analysis, and Findings

4.6.1 Purpose of this Round

The programme for the third round of interview sessions extended over the period 1 March to 18 March 2013, again covering a geographical spread of SA.

The purpose of the third round was similar to that of the second, but with a heavier concentration on IWPP projects, and the discovery of what leads to ineffective implementation of RM in the context of such projects. This round involved interviewing individuals with greater experience of IWPP projects, such that the emergent grounded theory established from the data gathered from Interviewees 1-7 and 8-14, could be properly validated and further developed if possible.

4.6.2 Selection of Interviewees 15-21

The participants for the third round of interviews were also identified using the snowballing technique, their names being obtained through recommendations from previous interviewees. This enabled the identification Interviewees 15 to 21 (see Table 4.4).

Round	Interview NO.	Organization Role	Organization Name	Participant Position	Experience	Interview duration
3	Int.15	Government Official	SWCC	Director of Project Execution Dep.	27 Years	91.6 Min
	Int.16			Chairman of supervision Committee	25 Years	81.2 Min
	Int.17	Consultant	Fichtner company	PM	14 Years	67 Min
	Int.18	Project Promoters (SPV)	SWEC	Director of Projects Dep.	22 Years	71.4 Min
	Int.19		SqWEC	PM	16 Years	84 Min
	Int.20	Contractor	Doosan Heavy Industries	PM	19 Years	73 Min
	Int.21	Facilities Provider	Shuaiba Water and Electricity Co.	Operational Manager	18 Years	63 Min
	Total					531.2 Min

Table 4.4: Details of Third Round Interviewees

For the third round of interviews (15-21) greater attention was paid to the specific context of IWPP projects, and as recommended by Fontana and Frey (1994), the participants were encouraged to talk in their own terms about the issues identified, and to clarify and extend their comments as much as they wished. Interestingly, the conversations (all of which were audio-taped) lasted longer than in the previous two rounds, taking an average of seventy-six minutes

4.6.3 Emergent Grounded Data from the Third Round (Interviews 15-21)

The analysis of the third round of interviews revealed the emergence of some new issues and patterns of activity affecting the implementation of RM in IWPP projects in SA. Specifically, the phenomena of Lack of awareness, inadequate planning, and inadequate monitoring and evaluation are explored, and the patterns emerging from the grounded theory analysis are shown in Figure 4.9 as follows: (1) People; (2) Organisation (Lack of Awareness); (3) Resources; (4) Project complexity; (5) Critical risk factors; (6) RM tools; (7) Policy

(Inadequate planning); (8) Stakeholder management; and (9) Lessons learned (Inadequate monitoring and evaluation). It was found that these categories all had an influence upon the success or otherwise of RM implementation.

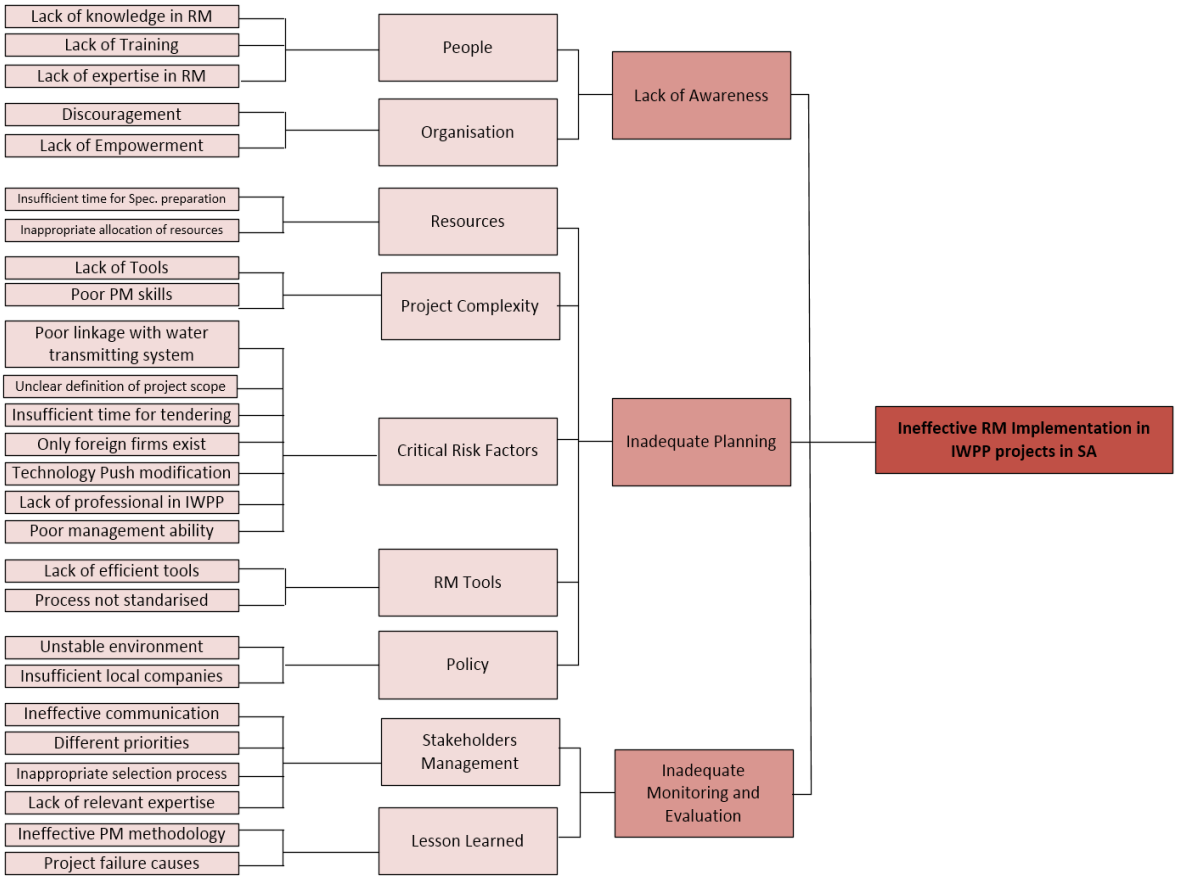


Figure 4.9: 3rd Round Emergent Theory

With the focus on IWPP projects rather than simply on WPP projects as in previous rounds, the data obtained from the third round demonstrated the importance of three main phenomena, in which nine categories and twenty six sub-categories were identified as reasons for the poor implementation of RM. As with the presentation of the second round findings, only data that promoted changes to the emergent model (phenomena, categories and sub-categories) are reported. This data represented a minority of the entire amount of information collected in this final round of interviews.

Phenomenon 1: Lack of Awareness

Practitioners in this round confirmed the importance of awareness of RM in IWPP projects in SA, and also agreed with the categories. They suggested slight modification to the sub-categories in as much as they wanted to include within the People category, lack of knowledge of RM, lack of training, and lack of expertise in RM (People); and within the Organisation category, discouragement and lack of empowerment.

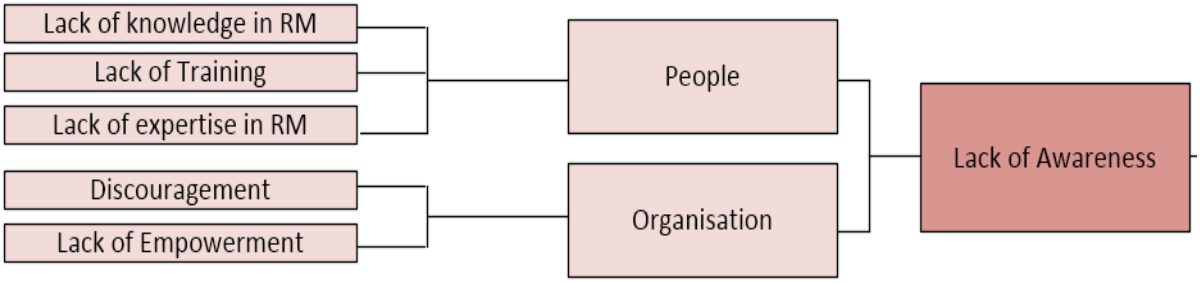


Figure 4.10: 1st Phenomenon Tree: Round Three

The categories and sub-categories featuring in Figure 4.10 were derived from the data and hence, considered by practitioners to exert the most influence on the effectiveness of RM implementation in IWPP projects in SA in regard to the phenomenon of Lack of Awareness.

Category 1 - People

In the People category, some modification to the sub-categories was forthcoming on the basis of the third round practitioners' comments. This modification resulted in the emergence of three sub-categories, these being: Lack of knowledge of RM, Lack of training, and Lack of expertise in RM.

Lack of Knowledge in RM (1.1)

As the previous rounds confirmed, RM knowledge in IWPP projects in SA is at a very low level, and the majority of individuals working in the water and power industry have no understanding of how to identify and manage risk. This was appreciated as a genuine

problem, as noted by Interviewee 17 who said: *"Workers in IWPP projects need to have full knowledge of RM as this kind of project is complicated"*. Moreover, Interviewee 15, with 27 years' experience of such projects said:

> *"we will continue to see failed projects if we cannot raise the RM knowledge among people who are working in them from all parties such as consultant, contractor, government, sub-contractor, financial supporter, operating party of the project and so on. For example, if the party who is responsible for finance gets full knowledge about the risks related to finance so he will know all the causes and effects of this issue, here he will be aware of any problem might happen. This knowledge will lead to increase the effectiveness of project performance".*

It is clear that lack of RM knowledge is a serious problem in the Saudi Arabian context, and that it undoubtedly leads to poor RM implementation, and hence great susceptibility to the whole range of risks identified earlier. Consequently, it is important to establish a robust strategy by which to build and increase the knowledge of RM among all those involved in IWPP projects, at all levels, in order to avoid failure. Interviewees 19, 20, and 12 also confirm that this issue needs to be considered in respect of every single individual involved in any organisation associated with an IWPP project.

Lack of Expertise in RM (1.3)

The lack of knowledge in RM is clearly the result of the lack of expertise in RM, since if sufficient expertise existed, the relevant knowledge would be imparted by experts to others in the teams involved in IWPP project in SA. However, such projects are still relatively new in SA, and there has been little time for a history to accumulate and for great numbers of experts to develop. Not surprisingly, this scenario is problematic for the WWP industry as observed by Interviewees 15, 16, and 18 who all expressed the opinion that IWPP projects fail because of the enormous shortage of RM experts, who can guide projects to successful completion.

This particular type of project was seen to require RM experts perhaps more than other projects, because of the plethora of risks involved, many of which pass unidentified at the

early stages of the project. Practitioners perceived the need to develop expertise in the area as critical in order to stem the spate of failures.

Category 2 - Organisation

Awareness of RM in related organisations in IWPP projects in Saudi Arabia does not exist, as most of the organisations are themselves newly established and have not developed to the stage where they have contemplated the formal implementation of any RM approach. Interviewee 15 focused on two important issues related to organisational awareness, when he said: "*without giving people in the organisation the encouragement to become involved in RM, they will be discouraged from learning, and without giving RM people in the project the power and encouragement to deal with all risk aspects, IWPP projects will face many problems"*. Practitioners in the third round were asked about reclassifying the sub-categories relating to awareness within the organisation, and they confirmed to these important sub-categories and they confirmed the two separate issues of general discouragement, and lack of empowerment.

The sub-categories assigned to the overall category of Organisation, were Discouragement, and Lack of Empowerment.

Discouragement (2.1)

An important factor that leads to reductions in the level of awareness of any particular phenomenon in any organisation is the amount of encouragement or otherwise which individuals feel they receive to become aware, or to remain ignorant, and encouragement itself should come from senior managers who must be able to motivate employers to learn. In this respect, Interviewee 16 referred to the role of organisational culture, saying: *"when negative practices take place in an organisation, they discourage employees and can even decrease their productivity. In the IWPP organisation, as it has many different parties, their cultures differ, and the environment is different, so tasks are not clearly defined which will lead to discouraged people"*. Thus, it is crucial for organisations to take responsibility for encouraging workers to become knowledgeable about RM, since with increased awareness, so

too will there be raised productivity, and greater chances of project success.

Lack of Empowerment (2.2)

Third round practitioners confirmed ideas expressed in the previous two rounds of interviews to the effect that some person or team associated with the project concerned, must be invested with enough power by the top management to make decisions regarding risk as and when such decisions are necessary, without having to refer upwards for approval. Only where such arrangements are in place can RM be practised effectively as often there is a need to move swiftly. Where teams are not empowered to deal with risk in this manner, the risks concerned may come to fruition and lead to failure.

Phenomenon 2: Inadequate Planning

The participants in the third round of interviews were in strong agreement with their predecessors in the first two rounds, that planning represented a key problem in the execution of IWPP projects. They provided opinions which led to the re-labelling of this phenomenon as Inadequate planning, the result of which was poor RM implementation. Consequently, a re-organisation of some of the categories and sub-categories established in the earlier rounds occurred, and re-labelling is seen as demonstrated in Figure 4.11.

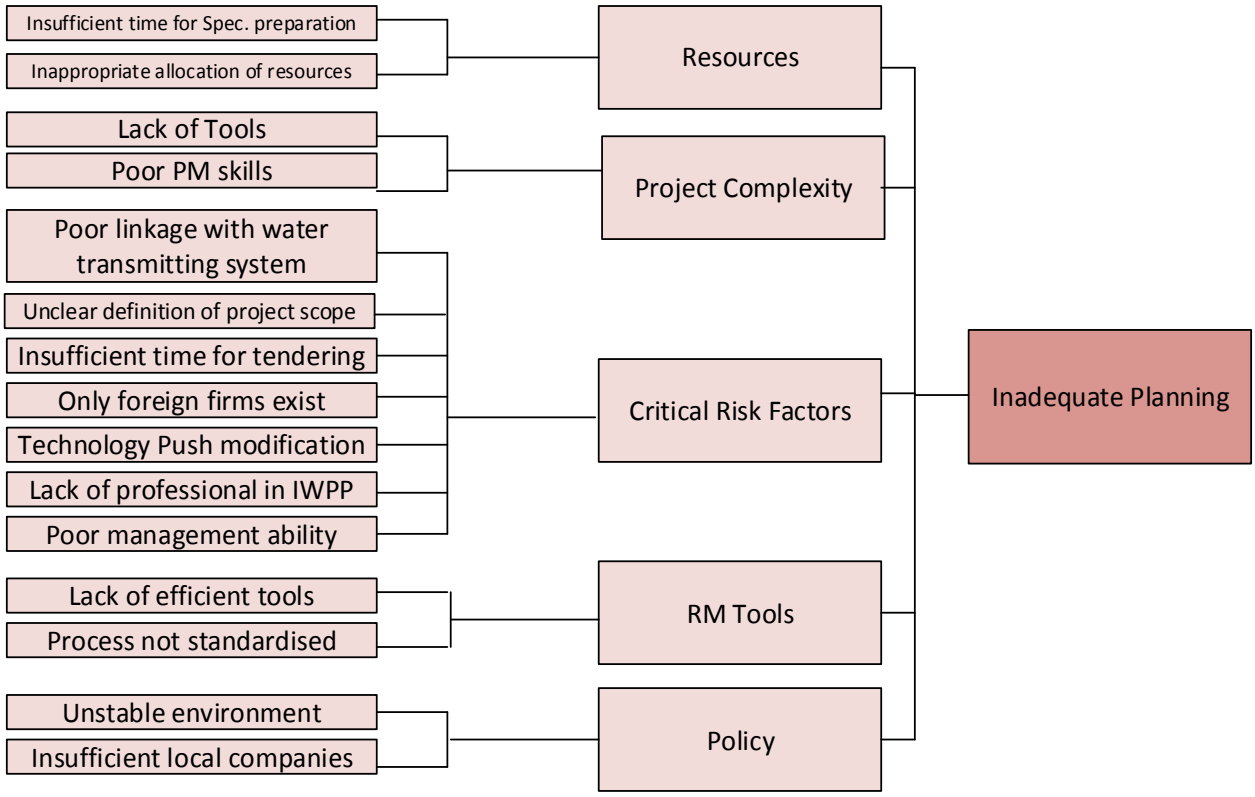


Figure 4.11: 2nd Phenomenon Tree: Round Three

As depicted in Figure 4.11, the data analysis from the third round of interviews, led to the categories taking the following shape: (3) Resources; (4) Project complexity; (5) Critical risk factors; (6) RM tools; and (7) Policy. Within these five main categories, fifteen sub-categories emerged as follows: Within the Resources category, insufficient time for specification preparation, and inappropriate allocation of resources appeared; within the Project complexity category, lack of tools, and poor PM skills were identified; within the Critical risk factors category, seven sub-categories were highlighted, these being: poor linkage with water transmitting system, unclear definition of project scope, insufficient time for tendering, only foreign firms exist, technology push modification, lack of professionals in IWPP, and poor management ability; within the RM tools category, lack of efficient tools, and process not being standardised were identified; and in the Policy category, the two sub-categories of unstable environment, and insufficient local companies emerged.

These categories and sub-categories thus represent the factors exerting the greatest influence

on RM implementation in IWPP projects in SA, from the viewpoint of Inadequate planning.

Category - 3 Resources

The allocation of resources plays an important in role in the overall planning process, and is identified as such in the phenomenon entitled Inadequate planning. This is especially the case where the project is complex as happens in the Saudi water and power industry. Interviewee 20 noted that "*to get good results in your project, it is crucial to pay more and more attention to the resource allocation*".

In discussing the overall issue of resources, practitioners believed it was possible to separate time as a resource, from the allocation of other resources, commenting on the time required to prepare the initial specification, and the subsequent allocating of all other resources over the lifetime of the project.

Insufficient Time for Specification Preparation (3.1)

Undoubtedly, the preparation of the initial specification is an extremely important element in any project since it is at this stage that the quality requirement is established, and in order to do this the appropriate people need to be involved in designing the document. Interviewee 17 referred to the importance of having sufficient time to do this, saying: *"In water and power plant projects, this issue not only needs enormous inputs by experts in water and power, but also sufficient time to come up with a high level project specification which can run during the project lifecycle smoothly"*. Moreover, Interviewee 20 confirmed the need for time well in advance of the anticipated project start date, saying *"working on the specification preparation should be done before any project starts by letting the related organisations study the spec all times and letting and Study and Design department study it, and having experts ready at any time to put the required spec in any project"*.

Inappropriate Allocation of Resources (3.2)

Resource allocation involves deciding how to place labour, materials, and equipment, and this

must be done effectively and efficiently in order to meet the objectives of any project. It also involves scheduling the availability of resources so that no delays are experienced in waiting because the right resources are not provided as and when they are required. Interview 19 commented on the need for proper planning in this respect, noting that effective allocation "*means that the allocation process will require an accurate plan, and failure to allocate resources will lead to a failure of the project"*. And Interviewee 21 drew attention to the need for knowledgeable individuals to be involved in resource allocation, pointing out that *"things in the project will always change and expert people know how to allocate resources appropriately"*. Hence, there is also a need to be able to consider resources in a flexible way in the face of surprise.

Interview 15 summed up the importance of effective resource allocation to the success of RM in any IWPP project, by saying: *"the project manager and executive people should do the following: determine what resources the project will need, determine who the best people are to do the tasks, add them into the project plan and consider that each labour resource is a human being, and you should be ready to any circumstances"*. Without doubt, an appreciation of the value of people to the project should be evident.

Category - 4 Project Complexity

Project complexity, having been discussed throughout the three rounds of interviews, emerged as a category in its own right under the umbrella of Inadequate planning, and within that category, the two sub-categories of Lack of tools (4.1) and Poor PM skills (4.2) were highlighted as explained earlier.

Category - 5 Critical Risk Factors

As indicated in Table 4.4, the third round practitioners tended to possess a great amount of experience in the water and power industry, and not surprisingly, they were able to identify some additional practical risk factors associated with IWPP projects in Saudi Arabia.

Consequently, this category was re-classified as consisting of seven sub-categories as follows: Poor linkage with water transmitting system, unclear definition of project scope, insufficient time for tendering, only foreign firms exist, technology push modification, lack of professionals in IWPP, and poor management ability. All of these different sub-categories were believed by third round interviewees to warrant consideration at the initial planning stage as part of the attempt to cover all major risks. Additionally, they argued that by taking note of these factors and attempting to reduce the likelihood of risks associated with these arising, organisations would at the same increase knowledge of RM among all those involved with a project, and therefore, contribute towards the development of expertise, and the increase the chances of project success.

Poor Linkage with Water Transmitting System (5.1)

This sub-category was identified in the previous rounds, and was confirm by participants in the third round as having been a problem in two of the four IWPP projects that SA had currently been involved in. Interviewee 20 raised the issue of liaison between the contributing parties to a project, saying: *"as there are lots of interfaces in this kind of project and because there are lots of organisations concerned, the link between them become complex"*.

Unclear Definition of Project Scope (5.2)

It was noted that in IWPP projects there are frequent disputes between the parties in terms of who is responsible for what, and this is clearly the outcome of a lack of clarity in the definition of the project scope. Interview 17 encapsulated the problem in his statement describing the reality, saying: *"when some issues arise during the management meetings of the project, you will see some people thought these things should be part of the project and others said that it should not be included. This means we have problem in defining the important part of the project which is the scope"*.

Practitioners in this round stated that although the deliverables in the project are listed in the scope, specifications still cause confusion as they are not drawn up with full attention to the

complexity of such projects. For example, confusion still remains in WPP projects regarding the amount of work involved for the various parties; and the element of change is also a problem as in each meeting, the teams involved often suggest new ideas for the project, which might well be improvements, but which were not thought about earlier and therefore imply the need for new work which was not planned.

Interviewee 18 noted that *"in IWPP projects, the lack of clarity in the project scope means that the plan is continually changed",* and Interviewee 20 confirmed that when he said *"large projects such as IWPP projects must live with some ambiguity within their scope as they are technical projects and need regular modification"*. All practitioners referred to the need for the project scope to contain project objectives, deliverables, project specifications, milestones and technical specifications. In stipulating these requirements, they were all in agreement that poorly- defined project scopes would certainly lead to project failure.

They emphasised that the project scope represented one of the most important documents within the overall project plan, and that writing this document carefully, and with as much detail as possible was crucial. Furthermore, they stressed the need for all stakeholders in the project to participate in developing the scope because in such a case, risks could be avoided, and there was a much better chance of project success (Interviewees 15, 16, 18, and 20).

Insufficient Time for Tendering (5.3)

As already indicated earlier in the thesis, the needs for water and power in SA are great, and time is of the essence in ensuring that the nation continues to receive these basic utilities. However, the pressures this causes within the water and power industry means that parties to projects tend not to spend sufficient time preparing their tenders, as the time set by government for the process is relatively short. Hence, the initial specification preparation, and planning activities are rushed to meet tendering deadlines, to the detriment of an eventual master plan. Interviewee 20 explained this issue, saying: *"giving appropriate time for tenders will avoid many problems and increase the benefits such as getting the appropriate IWPP parties, gaining quotations from sub-contractors and suppliers and suggesting valuable comments to the governmental organisation*".

Moreover, as IWPP projects are enormous, and complex undertakings, that might take as much as 20 years to complete, it is imperative for sufficient time to be set aside for the tendering process since this can only be beneficial in the long term. As noted by Interviewees 18, 20, and 21), all parties would benefit by a longer tendering period because the opportunity would be presented for a detailed consideration of likely risks and the strategy for covering these.

Only Foreign Firms Exist (5.4)

It was seen that the Saudi water and power industry is challenged by the relatively small number of local companies, and that the government is compelled to invite foreign organisations to bid for participation in IWPP projects. Third round interviewees understood that these companies faced many difficulties such as dealing with the Saudi culture, national policy, identifying unknown and known risks, a lack of knowledge of local work practices, a lack of understanding of the Saudi procurement system which is complex and bureaucratic, and a lack of understanding of the legal and financial aspects and so on.

Category - 6 RM Tools

Interviewees 17 and 19 commented on the lack of availability of RM tools generally for use in construction projects, but also emphasised that this was a particularly crucial problem in IWPP projects because their complexity demanded effective RM. Indeed, both interviewees felt it should be mandatory for such tools to be in use in these projects, since they would facilitate the efforts of project teams to address all risks and uncertainties, and also to continually track them. Interviewee 15 complained of the absence of such tools being a long-standing problem, when he said: *"a lack of RM tools in IWPP projects is not a new subject as the previous projects were also in need of them but they still do not exist. Hopefully in the coming project they will be applied"*.

Whilst the category of RM tools was devised in the previous rounds of interviews, practitioners in the third round considered it appropriate to divide the category into the two sub-categories of: lack of efficient tools (6.1), and the process not being standardised (6.2)

Category -7 Policy

The sub-categories of: unstable environment, and insufficient local companies, were suggested by practitioners in this round as being relevant to the overall category entitled Policy.

Unstable Environment (7.1)

Practitioners observed that as the IWPP approach is considered as a new trend in the Saudi water and power industry, a new official organisation has recently been established to determine the policies and practice to be adopted within it. Whilst this is a welcome move, it is nonetheless the case that the relative infancy of this organisation means that it is by no means mature, and requires more time to make its decisions. Consequently, the environment is believed to be unstable, and practitioners appreciated that such instability is problematic for foreign parties. In particular, Interviewee 17 said that "*Although the Saudi government facilitates the overcoming of all difficulties for foreign companies in order to encourage them to participate in such projects, they are still facing problems as this type of project is new and more time is needed to establish the process to be followed".*

And Interviewee 20 also made reference to the fact that some of the organisations participating in IWPP projects are still in their early developmental stages, when he said: *"Some semi-government organisations such as the Water and Electricity Company (WEC) have only just established after starting this approach, and they are working on issuing a standard process to fit this approach".* It was accepted by all practitioners that the environment will continue to be unstable until a sound methodology for operation (systems, process, contracting, and requirements) has been devised and tested, and they believed that this level of instability would inevitably affect project objectives.

Insufficient Numbers of Local Companies (7.2)

Whilst this sub-category was seemingly identified previously when reporting on the need for and presence of foreign companies, practitioners in this round suggested repeating this issue in another format and placing it in the Policy category as the current Saudi government policy

is to support all small Saudi companies, and practitioners believe this may be an inappropriate policy at this moment in time, and that greater involvement by such companies would lead to project failure. Interviewees 16, 17, 18, 20 and 21 all agreed with the government wish to qualify Saudi companies to participate, but suggested that it was too soon, without proper training and the acquisition of expertise, for these companies to be involved in complicated and mega-projects.

Phenomenon 3: Inadequate Monitoring and Evaluation

Interviewees in the third round identified that inadequate monitoring and evaluation contributed significantly to the ineffectiveness of RM implementation in IWPP projects in SA. Such projects are considered as mega-projects, possessing very many interfaces and requiring many complicated tasks to be performed. They are in need of continuous monitoring and evaluation in order to ensure that they run as scheduled in the original specifications. An enormous amount of effort is required if there is to be no loss of control, as was noted by Interviewee 16 who said: *"losing the control of implementing RM in such big projects starts when they fail to properly monitor the project"*. He then added *"getting feedback about each task and presenting this to the related people will help improving the implementation*".

Practitioners interviewed in this round did therefore, generally agree that the entire issue of inadequate monitoring and evaluation was a definite phenomenon, constituting a major and relevant category of risk. Interviewee 21 confirmed this, saying: *"IWPP projects need big efforts in monitoring the project in order to have effective implementation of RM"*.

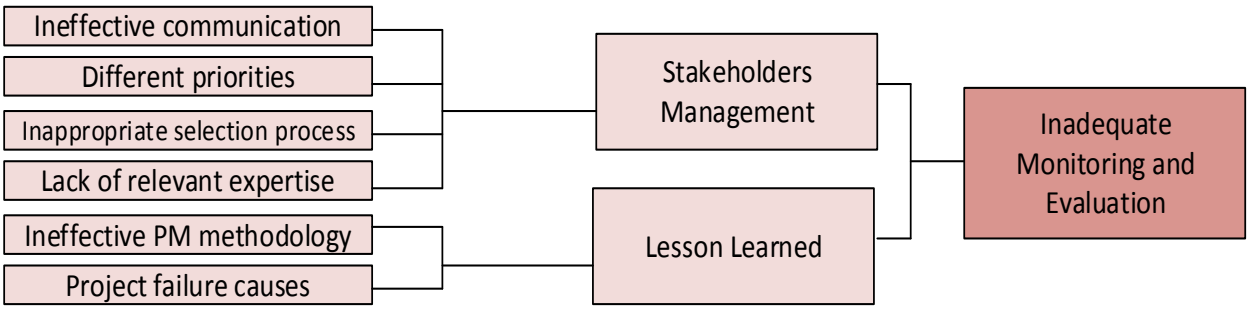


Figure 4.12: 3rd Phenomenon Tree: Round Three

As shown in Figure 4.12, the categories and sub-categories of the third phenomenon, Inadequate monitoring and evaluation, emerged as being: (8) Stakeholder management, and (9) Lesson learned. Within these two main categories, a total of six sub-categories were identified. Four of these were associated with Stakeholder management, these being: ineffective communication, different priorities, inappropriate selection process, and lack of relevant expertise. The two sub-categories of the Lesson learned category, were established as: ineffective PM methodology, and project failure causes.

Category - 8 Stakeholder Management

Stakeholders were seen to play a crucial role in IWPP projects, and consequently their right and proper involvement must be assured. In this respect, Interviewee 18 argued that *"stakeholders must be involved in IWPP projects as each one has its own goal in the project, and getting their views will help to reach the effectiveness of RM implementation"*.

Four sub-categories were highlighted, as shown in Figure 4.12, these being: ineffective communication, different priorities, inappropriate selection process, and lack of relevant expertise, but only the newly-emerging dimensions are explained.

Different Priorities (8.2)

As already noted, there are often a number of stakeholders in IWPP projects, and it is inevitable that different priorities are held among them. In this connection it is important to understand what all these priorities are, otherwise RM becomes impossible to achieve. Interviewees 15, 17 and 20 were keen to point out that it was essential to be aware of the individual priorities of the various participating organisations, and that a management tool should be used to help organise these in the form of a matrix such that all stakeholders can share this information, and that misunderstandings can be avoided. Emphasising this need, Interviewee 21 said *"it is essential for the project team to know the different priorities of the stakeholders to run the project successfully"*. It was also confirmed by the practitioners that priorities change over the lifecycle of a project and that these must be monitored on a frequent

and regular basis.

Inappropriate Selection Process (8.3)

Practitioners in the third round of interviews identified a new sub-category which they considered to be of great importance given the complex nature of IWPP projects. In this respect they drew attention to the need for the most appropriate individuals to be selected to participate in the project. Interviewee 17, for example said: *"As IWPP projects are complex and costly, an accurate process for selecting IWPP parties and project teams is vital and they need to take sufficient time in each one"*. Likewise, Interviewee 20 remarked: *"One of the most important decisions related to IWPP projects after receiving the proposal is to select the appropriate parties; anyway it is the government's official responsibility as the Water and Electricity Company (WEC) organisation do in SA"*. And Interviewee 15 noted that *"Once the project proposal has been received, there is an important question that needs to be considered before an organisation decides to approve it - are there suitable parties are available or not? If not, conduct it by the WPP method"*. Hence, in the appointment of all project parties (consultant, SPV, contractor, vendor, operator), the organisations involved must ensure that they have the appropriate experience and knowledge to successfully meet the terms and conditions of their contracts, and can in fact do the job.

Category - 9 Lesson Learned

Being able to describe what has gone wrong and what has been successful throughout the lifecycle of any project is vital, and ideally, records of such occurrences should be made at the time so that a database of past success and failure becomes available. Current and future projects are able to benefit from such information, as they experience savings in time, money, and effort through working with confidence and not on the basis of trial and error. Interviewees 15, 16, 19, 20, and 21 all confirmed the importance of the project lesson learned, and highlighted the unsatisfactory fact that there are no such records of progress for any of the four previous IWPP projects, nor even for the WPP projects. The absence of such guidance was considered to have led to major problems that have caused delays and wasted money. Reflecting on the reason why there is no formal mechanism for detailing past practice,

Interviewee 15 said: *"the reason behind not recording the lesson learned is that we do not have any clear process or something that forces us to do it"*.

Obviously, the consequences of not having a lessons learned process are extremely damaging for any project, as they bring an increased likelihood of repeating actions that have actually brought about project failures, time overruns, budget overruns, and scope creep.

Given what has been indicated earlier, however, about the RM process within WPP and IWPP projects being operated on an informal basis and without any standard practice or procedures for guidance, it is not surprising that the lesson learned component of effective PM practice is absent. There is simply no attempt to document major risk facts which have occurred in previous projects, a situation which practitioners expressed great concern about. In the absence of a methodical RM process, individuals lose sight, and therefore, control of the risks, and regrettably, it is only those people who have actually encountered particular risks in previous projects who are able to provide information. With the passage of time, memories of risk events fade, and that information becomes vague rather than clear and detailed. Interviewee 16 stressed the need for absolute clarity, saying *"lessons learned should include naming the risks, a brief description of the problem or success, the impact on the project (e.g. schedule, cost, scope, quality), and recommendations"*.

The sub-categories of Ineffective PM methodology, and Project failure causes were suggested by practitioners in this round as being relevant to the category Lesson learned as result of the data analysis. These sub-categories have been discussed in previous rounds.

4.6.4 Summary

The third round of data analysis in the GT style, produced emergent themes that embody three main features, nine categories and twenty-six sub-categories. These separately-identified factors lead to ineffective RM implementation in IWPP projects in SA. In this round of interviews, the researcher was able to involve individuals with substantial experience over many, many years, of working in RM on IWPP projects, and coming from different parties.

Hence, a fully comprehensive perspective was obtained which allowed for the development of some different and additional emergent themes, such as organisational culture and its impact on the amount of encouragement provided for RM, and the extent of empowerment RM specialists are extended. Furthermore, the increased length of the interviews generated in-depth data which served to clarify certain issues that were raised in the previous rounds but which were not fully articulated.

Consequently, the eventual phenomena, categories, and sub-categories derived from the grounded data analysis represents an interpretation of the saturated data and depicts the true picture of the reasons why RM implementation in IWPP projects in SA is not generally successful. The saturation of data were reached when the practitioners felt that the categories and their relationships are well established, developed and validated. Also when the researcher could not collect new or relevant data.

All practitioners suffer from poor RM implementation in all WPP projects, and claim the informality of the RM process to be the culprit. Furthermore, they want an urgent solution to this problem since WPP and especially IWPP projects are both complex, and extremely important to the nation, and cannot be left to flounder because of management inefficiencies and ineffectiveness.

4.6.5 Saturation Point

From the summary just provided, it can be appreciated that the third round of interviewing served to consolidate the data obtained in earlier rounds, and to ensure that any remaining facts not previously identified, were brought to light. For this final round, therefore, participants with very long experience were invited to contribute since when aiming for saturation, it is such individuals who have the capacity to draw on their knowledge and experience to plug any gaps in the story.

The precise situation in round three was that after the second interview, nothing new emerged. The last five interviewees (17, 18, 19, 20, 21) confirmed all the data and interpretations

already gathered and presented in the propositional diagrams, and hence, it was concluded that the data had reached saturation point, and that the emergent theory was as complete as it could be. Figure 4.13 illustrates how the themes were developed.

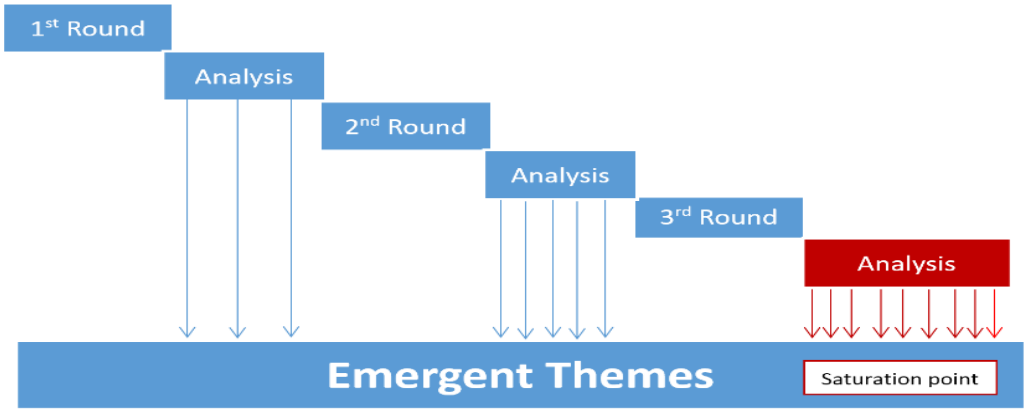


Figure 4.13: Development of Emergent Themes

In respect of the practical risk factors, practitioners identified seven of these, some unique to WPP projects and others to IWPP projects. Importantly, these were completely confirmed by the third round participants who had the longest experience in the water and power industry and thus, the greatest ability to reflect over time.

Clearly, the GT methodology accumulates a great of amount of data, but the researcher must decide what is important to the precise objectives of the immediate study, and in analysing that data, the researcher continually focused on that need. This is not to say that data that might have not been entirely relevant to the study's objectives is worthless, since there are opportunities for exploring that data in the light of other objectives not of specific interest to this investigation, but possibly of value to the wider literature.

4.7 Findings from the GT Analysis

A brief summary of the findings from the GT analysis is now provided in advanced of an in-depth discussion in the following chapter.

- RM in WPP and IWPP projects in SA is practised informally. This confirms what is stated in the literature concerning construction-based projects generally in SA.
- This informal approach to RM arises because of the considerable ignorance about RM in the water and power industries, the total lack of research into this issue, and the consequent absence of any standard process for use in RM.
- Government officials perceive the application of formal RM to require more time, resources and knowledge, than is currently available in the race to launch WPP projects and satisfy the nation's needs; the time allowed for the preparation of tenders does not, therefore, allow contractors the opportunity to consider risk in sufficient detail.
- There is a serious shortage of qualified local contractors and consultants, no RM training is available for individuals involved with WPP and IWPP in any of the participating parties, and foreign firms are generally ignorant about the Saudi water and power industry. This situation contributes towards the creation of risk and the inability to manage it.
- All practitioners believe the ineffective implementation of RM, through this informal approach, is responsible for jeopardising WPP/IWPP project objectives, and that improved RM will has the ability to bring success to these projects.
- Contractors and consultants consider government organisations to present obstacles to the application of RM as the overall levels of awareness remain low, despite calls over the years for increased awareness.
- Some risk factors are general for all construction projects, some specific to water and power projects, and some only emerge in IWPP projects, but they are all important and should be addressed, and they are not addressed currently. Those specific to water and power projects and IWPP projects are: poor linkage with water transmitting system, poor technology push modification, lack of professionalism in IWPP, poor management ability in IWPP, the lack of involvement by Saudi firms in IWPP projects, insufficient time for tendering, and lack of clarity in defining the scope of IWPP projects.
- The large number of risks associated with IWPP projects occurs because of their unique characteristics as follows: there are novel risks with the model of public and

private sector collaboration, many organisations must work together for a long time, each organisation has its own goals/interests, there are complex structures and processes, each organisation has a different policy and culture, and social sensitivity is usually associated with this type of project.

- Three main features, nine categories, and twenty-six sub-categories affecting RM implementation in IWPP projects in SA are identified and presented in a model which is fully grounded in practitioners' experiences. Implicit in this diagram are the lessons learned from past experience. Hence, decision-makers have a tool that can promote a more enabling environment in which to implement RM.

- The water and power sector in SA suffers from a lack of experience in the IWPP approach as it is still in its infancy.

- Practitioners identified various factors as affecting the behaviour/performance of every single individual in every IWPP party towards risk, as follows: the uniqueness of the SA culture, the high subsidies paid by the government to consumers and organisations, both of which have an impact on the way individuals and organisations behave or view issues such as RM, and the low attention paid to RM from top managements (a result of top managers' lack of RM knowledge).

4.8 Conclusion

In total, twenty-one interviews were conducted in three separate rounds in order to develop a greater understanding of how the water and power industry implements RM in the IWPP approach. Concluding that RM is not practised in a formal and systematic way, the study has identified three major dimensions of the overall problem as being: *Lack of Awareness, Inadequate planning, and Inadequate monitoring and evaluation*

Subsequent to the identification of these major phenomena, the following categories emerged as separate areas for concern:

People, Organisation (Lack of Awareness), Resources, Project complexity, Critical risk factors, RM tools, Policy (inadequate planning), Stakeholder management, Lesson learned (inadequate monitoring and evaluation)

These emergent themes are fully grounded in practitioners' experience, and therefore constitute a new theory from the lessons learned from the past.

In the following chapter, a theoretical model integrating these themes is presented, and a discussion of the ways in which they affect the behaviour of individuals towards risk is provided. The literature reviewed earlier in the thesis is used in support.

CHAPTER FIVE: THE EMERGENT ISSUES ASSOCIATED WITH INEFFECTIVE RISK MANAGEMENT IN IWPP PROJECTS IN SA

5.1 Introduction

In presenting a discussion of the emergent issues concerned with the ineffective practice of RM in Saudi Arabia's power and water industry, this chapter bears in mind the way in which these issues have been identified, and argues for a strong degree of academic rigour and completeness.

Using the GT approach, it is possible to argue, that the impossible has been eliminated through the three rounds of interviewing, and that because of the samples chosen, it is highly likely that what has emerged does in fact represent the reality of the situation at this moment in time in Saudi Arabia. Consequently, the researcher suggests that the reasons for the failure of IWPP projects are quite definitely:

- Lack of Awareness,
- Inadequate Planning, and
- Inadequate Monitoring and Evaluation.

This chapter therefore, presents the model based on these three key phenomena identified through the GT methodology, and focuses on how individual behaviour is influenced by them to enhance risk and prevent the effective management of that risk. In doing this, the three phenomena, categories, and sub-categories are considered with reference to the literature review in order to reflect both practical and theoretical viewpoints. The discussion begins with a review and exploration of how the main categories and associated components which ultimately form the model, relate to the existing literature in the field of RM. Thereafter, an explanation of good practice in respect of RM can be imported in Saudi Arabia's Water and Power Industry, and particularly in the IWPP approach.

5.2 The Model

A model can be considered as "*a representation of reality*" (Acknoff and Sasieni as cited in Pidd, 2003:10), and used as the basis for understanding a complicated phenomenon. According to Beakley and Chilton (1974:268), "*models are simplified, idealised versions of complex systems .... [they] are used because the human mind works best with simple models…. One of the principal purposes of a model is to idealise and simplify the problem so that we can predict the performance of the design*". Fellows and Liu (2005) confirm these definitions, arguing that models might be seen as a translation of reality which must be as close as possible to the real world situation. Earlier in this thesis (Section 2.8), the researcher differentiated between the concepts of model, standards, and framework, opting for the use of the term 'model' in this study.

Beakley and Chilton (1974) offer guidelines for model construction, saying that researchers should think about the process involved, develop interesting implications, and look for generalities. And Pidd (2003:14) notes that any "*model will always be a simplification and an approximate representation of some aspects of reality*". He indicated the differences between reality and a model, highlighting that reality is always complex, subtle, and ill-defined, whereas a model can (and should) be simple, concrete, and well-defined.

As the interviewees in this study were selected according to their experiences and involvement in WPP projects in SA, they represented a sound source of information concerning the reality of that particular situation. Consequently, through relating their experiences, opinions, perceptions and reflections on the RM processes in evidence in their respective organisations, they were able to provide data upon which a simple, concrete, and well-defined model of that reality could be constructed. Moreover, as Glaser (1978) advised compiling as diverse a sample as possible to be able to arrive at a generalisable theory (model), the researcher formed a comprehensive interview sample by choosing participants with long, relevant and varied experience, and conducted twenty-one interviews in three separate rounds to ensure a robust understanding of how RM is practised in the IWPP approach as adopted in the Saudi water and power industry.

The three main dimensions of the model were identified as:

Lack of Awareness, inadequate planning, and inadequate monitoring and evaluation

And the categories and sub-categories deriving from these dimensions were identified as:

People, Organisation (Lack of Awareness), Resources, Project complexity, Practical risk factors, RM tools, Policy (Inadequate planning), Stakeholder management, Lesson learned (Inadequate monitoring and evaluation)

The model is illustrated in Figure 5.1.

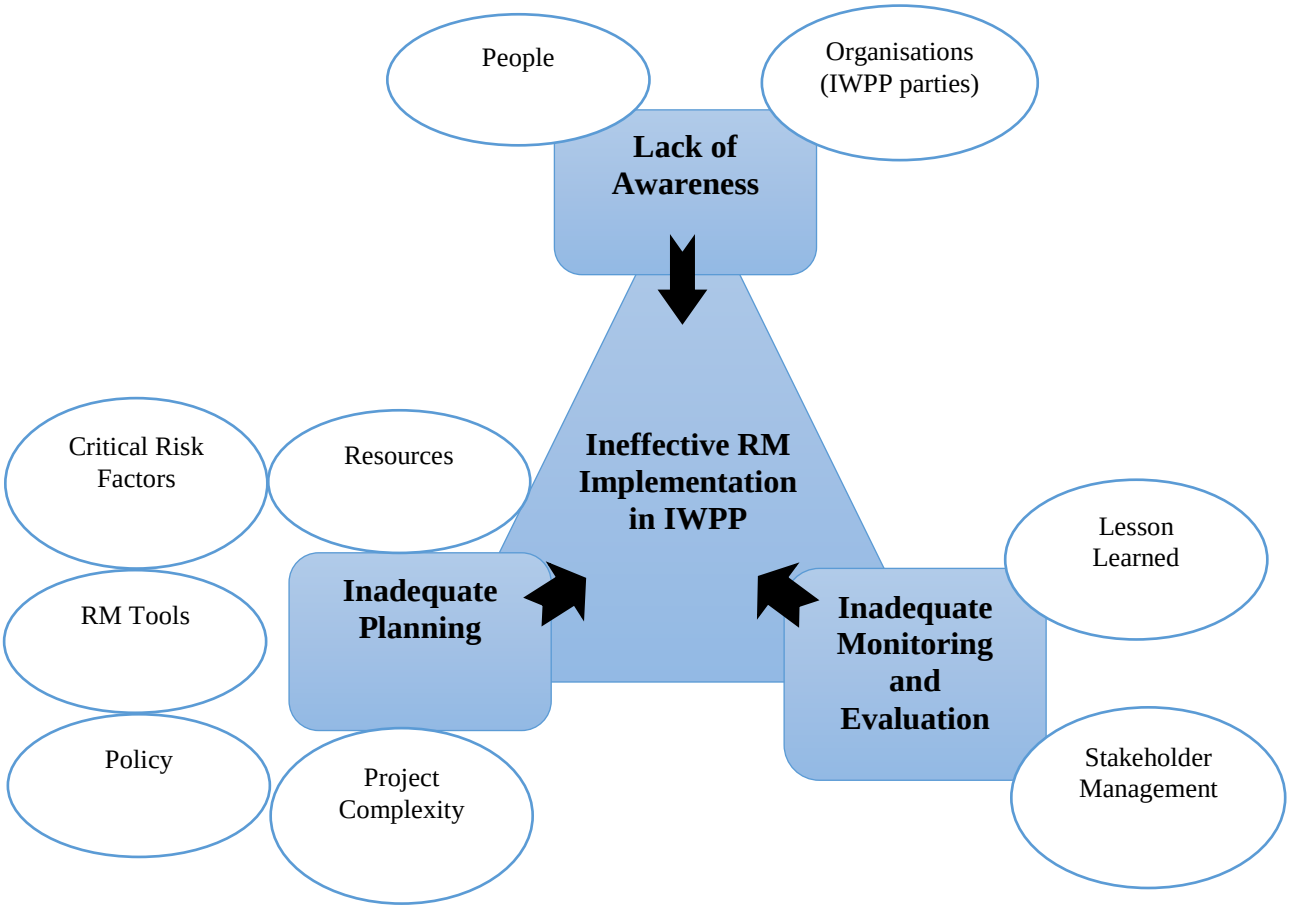


Figure 5.1: Model

The above model can be used as a grounded basis on which organisations in water and power industry can build.

5.3 Problems of RM Implementation in IWPP Projects in SA

Glaser's (1978:93) explanation of the objective of the GT methodology is that it intends "*to generate a theory that accounts for a pattern of behavior which is relevant and problematic for those involved".* According to Speziale and Carpenter (2007:133), *"The primary purpose of grounded theory is to develop a theory about dominant social processes".* The model produced as a result of the research in this study does in fact highlight the patterns of behaviour and social processes that influence the behaviour of every individual involved in IWPP projects in respect of their response to risk. The causes of the inappropriate behaviour patterns observed in IWPP projects are now discussed.

I. Uniqueness of the Saudi Arabian Culture

The Saudi culture predisposes individuals to behave in certain ways as follows:

a. Difficulties in accepting change

Saudi Arabian society is characterised by adherence to Islamic values, and cultural traditions which permeate the lives of the Saudi Arabian people. Profound inequalities in power and wealth precipitate extreme feelings of power distance, and the heavily rule-governed nature of day-to-day existence causes a tendency to avoid uncertainty. As a result of this high uncertainty avoidance characteristic, the society in general does not readily accept change and is very risk averse. Additionally, Saudi society is collective in nature, tribalism prevails, and collectivism is manifested in close long-term commitment to the member 'group'.

Islam, which governs every aspect of a Muslim's life, also precipitates a culture in which there is great attention to detail, and ethical behaviour is emphasised, with an emphasis being placed on such characteristics as generosity, respect, and solidarity. The outcome of this is that elders are rarely disobeyed, and certainly not challenged, that strong allegiances are shown to superiors and family, that the status quo is preserved, and that ideas of what might happen in the future are not necessarily encouraged because all things are decreed by Allah.

b. Communication issues

Communication in Saudi Arabian culture relies heavily on non-verbal cues such as: body language, eye-contact, tone of voice, facial cues, and the use of silence. However, the very many foreign companies operating in the Saudi water and power industry, and particularly in IWPP projects, are not always party to these cultural peculiarities, and hence, misunderstandings in communication are inevitable, because other cultures are much more direct in their communication strategies. Such misunderstandings arise throughout these projects and are seen to affect operations from the top of the hierarchy down to the bottom.

In addition, it is hard to gain an understanding of Saudi protocol and the manner in which business is conducted when communication problems occur, and clearly it is essential for the success of any venture, for such protocol to be appreciated. Business appointments and work meetings for example, must be scheduled to avoid the five daily prayer times and the religious holidays of Ramadan and Hajj. Furthermore, the hospitable nature of the Saudi business culture means that appointments and meetings may over-run. Therefore, it is customary to make advance appointments for periods of the day rather than for precise times, as there is a need to accommodate the more relaxed nature of business.

An individual's position in society also dictates how s/he may communicate with others; for example, subordinates must show respect to superiors, yet age is also significant. This can cause confusion if a superior is younger than a subordinate, and in this case the superior must tread carefully, which is not the case in foreign companies where no such cultural imperatives prevail.

Additionally, it is important to establish trust in the Saudi business culture since the cultivation of solid business relationships is the key to success. In a business setting, favours based on mutual benefit are often seen as part and parcel of the effort to develop trust, again in contrast with the way that Western business works. Moreover, the personal nature of business in Saudi Arabia means that family influence and personal connections often take precedence over other governing factors (Al-Ghamdi, 2008). All of these cultural predispositions affect communication between people, and are seen as alien by foreign companies.

To conclude this point, whilst the cultural effect on business practices in the SA, and the uniqueness of Saudi culture impacts upon everyday activities, as pinpointed by the practitioners, given the absence of published research on this precise issue in the context of IWPP projects, such influences are not reported in any literature.

II. High Subsidies by the Saudi Government

Given the essential nature of water and power, these services are mainly provided by the public sector, but are theoretically paid for by a large number of individual consumers, who may be highly susceptible to economic conditions and sensitive to changes in the cost of service. Clearly, the threat of disconnection is one way of ensuring that such consumers continue to pay, but the Saudi Arabian government acknowledges the vitality of water and power services, and does not resort to such practice, instead subsidising consumers so that they are never actually at risk. Consequently, in organisations, top management do not perceive the need to engage in RM and protect their organisations from risk, as any shortfalls in income will always be guaranteed by the government. Furthermore, the Saudi government grants the water and power plants with free oil in order to support consumers by charging low prices for these services.

In the real world, if a business is able to convince the government to provide subsidies, then that business is probably also able to convince the government to restrict competition. So government subsidies to businesses always occur in a restricted market, and it is business as opposed to individual consumers, that benefits.

A reform of the subsidy regime is politically sensitive, because citizens regard subsidies as an entitlement. However, the government is reluctant to remove subsidies as it wishes to avoid the kind of political unrest that has occurred elsewhere in the Arab World in the wake of the Arab Spring (Woertz, 2013).

III. Low Attention to RM from Top Management

Given the urgent need for WPP projects in Saudi Arabia, the top managements of organisations involved with such projects exert pressure on all participants to launch projects in a hurry. The outcome is that planning at its most fundamental level is rushed, and the attention given to RM is either low, or non-existent. There is no thought concerning how to plan for risk, how to identify risk, how to train employees to deal with risk, and what risks have been encountered in previous similar projects. Generally, the tendering phase for PPP projects extends to around 17 months (KPMG, 2010), in recognition of the complex nature of the activity, but government pressure on companies to make progress causes tendering to be squeezed, with the result that insufficient time for planning is available, and RM strategies are now even considered.

Indeed, most top managements in these kinds of project openly consider RM as a waste of time and resources, mainly because they themselves are ignorant of its importance in achieving project success, and because in some cases they are aware of the potential for government bail-out.

These three factors are important antecedents of the ineffective practice of RM in IWPP projects in SA, which have not previously been articulated in the literature, as to date no such in-depth research of this precise situation has been performed. Consequently, there is a direction here for further research on a more comprehensive basis.

5.4 Emergent Phenomena Causing Ineffective RM Implementation in IWPP projects in SA

Commenting on the GT methodology, Smith (1997) suggested that a general reading of the literature may be useful as a means of obtaining a feel for the issues at work in the subject area, and of identifying any gaps to be filled by grounded theory. Furthermore, consulting the existing literature does helps a researcher to understand how variables are constructed in the field (Glaser, 1978) and this is valuable since it can be extremely difficult to collect and analyse data in the absence of any theoretical context on which to draw, and the researcher may lose unique insight into the phenomenon being studied. A literature review also helps to

sharpen the researcher's theoretical sensitivity that gives substance to the analysis process. In a classic GT study, the review of the literature is typically not conducted until the final stages of the study to prevent the research from "*being constrained and even stifled in terms of creative efforts by our knowledge of it*" (Strauss and Corbin, 1990:50).

Given these understandings, the researcher used the existing literature as a basis for confirming or challenging the emergent themes after the point at which theoretical saturation was reached. This allowed the themes to be drawn from the data and not from speculation or preconceived ideas.

The phenomena in the emergent model are now discussed.

5.5 Phenomenon 1: Lack of Awareness

Lack of awareness was the first phenomenon to emerge from the data as all practitioners cited this as being a long-standing and serious problem preventing effective RM in IWPP projects in SA. According to Gilson (1995), awareness is often defined in terms of knowledge; of being familiar with certain facts; of being 'informed'. Gilson expands upon this, noting three inherent qualities of the concept as follows:

- It is knowledge about a dynamic environment, and must be maintained as the environment changes over time.
- It is maintained through perceptual information gathered from the environment.
- It is generally secondary to some other goal, which is usually related to something else.

In the context of IWPP projects, it was seen that an overwhelming lack of awareness was evident both among people (the individuals involved), and within organisations. Hence, there was seeming large-scale ignorance of RM as a concept, and its value to construction projects. Figure 5.1 illustrates how these two features are grouped together to form the phenomenon of

Lack of Awareness. And as shown in the previous chapter, the distinct sub-categories flow from the categories

Feature 1: People

This feature refers to the individuals employed in the various organisations involved in IWPP projects. The emergent sub-categories identified as impacting negatively on the effectiveness of RM are:

- Lack of knowledge
- Lack of training
- Lack of expertise

Lack of knowledge among individuals is seen as the direct result of two antecedents. The first is that they may never have been exposed to RM as a theoretical concept in their formal educational studies so they enter their professional lives in ignorance of this, and the second is that once in employment there is no encouragement from management to engage in this practice. This knowledge gap is genuinely problematic given the Saudisation programme which seeks to replace foreign workers (who are usually qualified in RM techniques and have the expectation to implement them) with Saudi nationals. If there is no inclusion in the Saudi curriculum of RM as a theoretical concept, and no practice in industry, the situation will arise where the current incidence of effective RM decreases as those with any knowledge of it disappear. Moreover, as the aim of Saudisation is to place more Saudis in top management jobs, the likely scenario will deteriorate even further.

Hence, the current situation in SA whereby RM is not considered as a subject to be taught in full-time education, must change. Pritchett (2001) makes a useful observation in this respect, noting that in some countries, schooling has been enormously effective in transmitting knowledge and skills, while in others it has been essentially worthless and has created no skills among the future workforce. However, it is also commonly seen in the developing world that even when knowledge and skills are acquired by individuals, such knowledge is

often not used, nor skills practised in employment because of various other external factors in their organisations. Indeed, specifically in the case of PM skills, these are frequently not accorded any importance in organisations, and certainly in the Saudi Arabian universities, they do not feature as curriculum inputs. It is thus apparent, that unavailability of sufficient numbers of skilled personnel to work on IWPP projects is a large risk in itself.

The second sub-category (Lack of training) is partly related to the first sub-category in that it describes the lack of ability of personnel, but practitioners indicated that this should be a separate sub-category as it includes elements of understanding about RM which can only be acquired on the job, rather than in universities and other off-the-job settings. Practitioners complained that no training is provided in the workplace to ensure that employees are familiar with the application of certain processes and techniques concerned with RM in their organisations. Moreover, they felt that students and employees have long been taught about, finance, marketing, and leadership, but they only know the theory, and cannot actually put any of this knowledge into practice, i.e., they do not know how 'to do' these things, and can rarely deliver positive outcomes, work to budgets, keep within time constraints, and meet stakeholder expectations. These comments are confirmed by Hopkins (2013) who observes that until recently, RM taught within the field of PM, has been confined in its use to big infrastructure, IT and consultancy schemes, which can take up to two years to develop, and that it has not been a subject that is widely taught in universities.

In the third sub-category (Lack of expertise), the fact that the majority of individuals have not been taught RM, and have not undergone any training on how to apply this in the real-life situation, is believed to have caused an overall lack of expertise. The definition of expertise is expert skill or knowledge in a particular field (in this case RM) and it is clear that expert skill cannot be developed overnight, but rather takes time to accumulate. Hence, an individual with expertise in PM would possess sufficient technical skills and experience to make an informed decision in any situation, and where more input is required, that person would know to consult an expert in whatever technical field required (as for instance, in contract management, procurement, engineering, licensing and regulation). Essentially, the PM functions as a facilitator or choir conductor. S/he needs to know about all the inputs to the process without

being an expert in any one, but knowing where to find the right advice when necessary. Moreover, PMs need other key skills besides those that are purely technical in order to lead and deliver on their projects successfully. Such keys skills and abilities are concerned with having a sound understanding of many facets of business, supervision, control, and being able to act on initiative and take responsibility.

There is no doubt that the three sub-categories of the People category (lack of knowledge of RM, lack of RM training, and lack of experts in RM) appear in the general literature as barriers to effective RM, but within the context of IWPP projects in SA, this knowledge has not previously emerged as the reality of the Saudi water and power industry is quite different from the scenarios in which the studies reported in the literature have been undertaken. The link between these three sub-categories and the overall phenomenon of Lack of Awareness is missing from the literature, yet it is clear that in the Saudi context, the lack of awareness that causes a failure to implement RM in IWPP projects, has as its antecedents, shortcomings in general/professional education, shortcomings in training, and deficiencies in the number of experts thus produced. Practitioners in all rounds agreed that this phenomenon is extremely important since it will not be possible to implement RM effectively if the awareness among individuals of its value to a project is missing

Feature 2: Organisations (IWPP parties)

Risk management in general is integral to modern business management because the environment in which business operates is dynamic and exposed to sudden risks. Clearly, it makes good business sense to identify the probability of risk and the potential for failure to achieve strategic and business goals, but in some countries, good business sense or otherwise, several voluntary codes and statutes include the need for RM as a general protection for business and society at large (Likhang, 2009). It is not surprising, therefore, that one of the emergent features in this study is the role played by organisations in promoting effective RM, or indeed in discouraging it. In this respect, two emergent sub-categories are identified in this study, these being: Discouragement, and Lack of empowerment.

All organisations are characterised by a culture, which may reflect the national culture, or the culture of a parent company from another country. That culture permeates throughout the organisation via several mechanisms which include the processes and attitudes inaugurated by the organisation, and supported over time such that they become instilled as values, and ways of working which are taken as given. The extent to which RM is practised is a result of organisational culture; and it can be seen how organisations bring this to bear in times of difficulty by considering the actions of two international companies, Worldcom and Enron that both encountered failure and that both elevated their RM, ethics, and corporate governance awareness to the top of their boards' agendas. As noted by Beckers et al. (2013) corporate failures occur mainly because written principles are not actually practised.

Considering this knowledge in relation to the cases of failure in IWPP projects, it can be understood that many of the parties involved, and especially the foreign ones, have acquired the knowledge and skills, and actually been successful in their practice of RM in their previous projects, but the principles they may have suggested be adopted by the IWPP project, have not been taken on board. Indeed, there is evidence from the interviews that decision-makers in IWPP projects in SA are not convinced of the merits of RM, they believe it is a waste of time and resources, and hence have ignored the advice coming from those with experience. Essentially, there has been no attempt learn from the mistakes of previous projects. Of course, these senior might be correct in their beliefs, as RM might be perceived as making no direct contribution to project success, but it does, undoubtedly provide an insurance policy in the event of delay or significant disaster, and it is known that no project is ever straightforward and devoid of risk. Nonetheless, these attitudes are held by leaders in many organisations and they serve to discourage the development of a RM culture within those organisations, sending messages to individual workers within the IWPP that risk is not to considered. The other side of that coin is quite simply that if risk is not to be considered, then no individual will be supported in any efforts to manage it; essentially, therefore, project managers lack empowerment and have no resources or motivation to work proactively to develop effective RM practices.

In discussing RM, Beckers et al. (2013) observe the difference between front-end project planning, and managing risk during project execution. The former is seen to be concerned with shaping a project's risk profile so that it can be appropriately managed during execution, and the latter is concerned with aggressively (proactively) mitigating the risks as they emerge. The key is to know what risks are inherent to a project and what degree of freedom (empowerment) is available to shape the risk profile before funds are committed. This level of interest in RM demands an organisation culture that accepts the need for, and value of RM. In the case of IWPP projects in SA, however, the contributing organisations both discourage and disempower individual employees from attempting to manage risk.

To the best of the researcher's knowledge, the literature has not raised these themes.

5.6 Phenomenon 2: Inadequate Planning

Inadequate planning is the second phenomenon that emerged from the data. Planning may be described as a process that considers how to complete a project within a certain timeframe, usually with defined stages, and with designated resources. Rouse (2013) provides a view of planning that identifies the activities involved as:

- Setting measurable objectives
- Identifying deliverables
- Planning the schedule
- Making supporting plans

During the interviews, practitioners suggested that inadequate planning is a perennial problem within WPP projects; this suggests that the practitioners themselves had worked on several projects in the past and had encountered continual problems as a result of poor planning.

There is much in the literature about poor project management, but as noted by Mochal (2003), of the five most common mistakes made in PM, poor planning tops the list. This seems to confirm what emerged in the interviews since the topic of poor planning was continually raised and cited as something to be improved.

In commenting on this issue, practitioners focused on five problems that emerged as features relating to inadequate planning, as follows:

- Feature 3 - Resources
- Feature 4 – Project Complexity
- Feature 5 – Critical Risk Factors
- Feature 6 - Risk Management tools
- Feature 7 - Policy

Feature 3: Resources

Resource allocation is the provision of resources required by activities, undertaken within a framework of consideration for both the resource availability and the project time. In an organisational context, resources are comprised of People, Materials and equipment, and Knowledge and time. It is essential to plan the allocation of resources effectively, and in this respect a resource allocation plan is an important tool. Two emergent sub-categories were identified in this category, these being:

- Insufficient time for specification preparation
- Inappropriate allocation of resources.

The dire need for water and power in Saudi Arabia escalates the urgency in respect of IWPP projects, and such initiatives are always established in an atmosphere of time pressure exerted by top management. Consequently, the PM plan is always prepared in a rush, and insufficient attention is paid to RM. The focus at this stage is on establishing who can deliver the complex specifications rather than on planning for risk, meaning that the lack of time allocated to this process exposes the project to many risks that may eventually cause the failure of the project as misunderstandings and misinterpretations during the execution phase by the various parties

arise. These usually result in delays and additional costs to the project. According to Arain et al. (2006), in construction projects, poor preparation of the specification leads to an escalation of risks in the execution and operation stages.

The allocation of resources other than time, refers essentially to people since as already shown, in the context of IWPP projects in SA, limited resources exist in this respect, and it is the case that the organisational culture discourages initiative from those who do possess RM knowledge and skills from actually using them. This represents a poor allocation of useful resources, and if an accurate plan of all resources needed and available for such complex projects were made, it would become obvious where such expertise lies, and how it could be more effectively used to prevent failure.

Feature 4: Project Complexity

The following sub-categories make up Feature 2 (Project Complexity):

- Lack of Tools
- Poor PM skills

Project complexity results from continuous demands for speed in construction, cost and quality control, health and safety in the workplace and avoidance of conflicts and disputes, together with technological advances, fragmentation of the construction industry, and environmental issues (Gidado, 1996). The level of project complexity is categorised as low, medium and high (Ireland, 2007) and the greater the project complexity, the greater the likelihood of high risk status.

Infrastructure projects such as IWPP projects have become and will continue to become significantly larger and more complex. This kind of project has many characteristics which raise it to the status of a mega project – it requires tremendous investment, and has complicated technology requirements – and losses due to the cost of undermanaged risks will continue to increase. This will be exacerbated by an ongoing shortage of talent and experience because not only are projects more complex, but there are also more of them, which will

create heavier demand for more effective and more systematic approaches and solutions (Beckers et al, 2013).

Unfortunately, in IWPP projects in SA, there are few if any, systematic approaches to RM, and risks are poorly managed as the responsibility for them is not properly allocated. In many cases it is possibly to identify parties who could take ownership of risks and be expected to manage them as they have more capability to absorb these risks than other parties. But often there is no attempt to allocate risk by governments because they misunderstand or disregard how private investors feel about this issue. In fact, private investors are sensitive to the kinds of risk they accept and under what terms, since they will often be the immediate losers in a situation where risks are poorly allocated or undermanaged. Even in PPP structures which are similar to IWPP approaches, private-risk takers and their management techniques are introduced too late to the process to influence risk management and allocation, and therefore, they cannot undo the mistakes already embedded in the projects. One crucial consequence is an increase in the cost of financing PPP projects and a greater need for sovereign guarantees or multilateral-agency support. In the end, however, society at large bears the costs of failures or overruns, not least in the form of missed or slowed growth (Beckers et al, 2013).

Feature 5: Critical Risk Factors

As explained earlier, IWPP projects are exposed to a wide range of risks because of the many and diverse organisations that must collaborate over a long period of time, and do so for the good of the project, whilst simultaneously protecting their own interests. Bringing their own goals, complex structures and processes, these organisations have different policies and cultures, and social sensitivities are usually associated with this type of project. Hence, unique risks specific to this approach are apparent. Some of these were noticed in the literature but some practical risks were identified by practitioners in the interview rounds.

It is also important to recognise that in IWPP projects, foreign companies are almost always involved to provide certain types of expertise, yet these companies are devoid of experience in the particular context of the Saudi water and power industry as similar projects may have

totally different risk characteristics in different regions. It is difficult for a newcomer to identify new risks or inherent risks in a completely alien environment, and even more difficult to assess these risks and the subtle impact of relationships among them when time is of essence and there are pressures to keep to schedules.

Clearly, it is irresponsible to ignore these risks, and such behaviour can result in unrealistic decision-making; but at the same time, the identification and evaluation of all the new risks and their relationships is a very complicated, time-consuming, and expensive process, which is almost impossible to complete for the majority of projects, especially when there are inadequate amounts of information and time. When such a complex scenario is encountered, it is vital to identify and control the risk factors since if these are managed, the risks themselves will not come to fruition.

Under this feature, the following sub-categories are clustered:

1. Poor linkage with water transmitting system
2. Unclear definition of project scope
3. Insufficient time for procurement
4. Only foreign firms exist
5. Technology push modification
6. Lack of professionals in IWPP
7. Poor management ability

The poor linkage with the water transmitting system emerged from practitioners who considered this to be a crucial practical risk factor that applies only in respect of IWPP projects. This risk had been encountered in previous IWPP projects but is not mentioned in any of the literature. In sub-category (2) unclear definition of project scope factor, this is seen to occur at the inception stage when the business plan/business case is created. Specifically, problems are apparent in the project requirements not being aligned with the business case, with the original identification of the project scope having been too ambitious to deliver and subsequently requiring to be toned down, and with the designer of the business case working

on the basis of assumptions rather than hard fact that was thoroughly explored. Through shortcomings in the definition of the project scope, changes in the later stages of projects occur to the detriment of the planned time and budget. Hence, practitioners considered this as a risk to be planned for.

Sub-category (3) insufficient time for procurement, is in one way similar to the earlier fact related to allocation of resources, since time for the preparation of the tender was identified in that factor, and here again, the speed with which the procurement process must take place constitutes a problem. For a mega-project the procurement process is vast and complex, inevitably involving a variety of risks, and it is imperative for those risks to be understood and mitigated by risk assessment and practical management and operational measures. Risk cannot be eradicated in either the business world or the public sector, so it must be accepted as part of the normal work environment, and accommodated. Some measures to manage risk can only be implemented if the procurement process is sound and systematic and applied across all activities, while other measures may be targeted to specific risks inherent in certain categories of procurement (IAPWG, 2006). In IWPP projects in SA, procurement activities are always rushed because of the time factor already discussed. This means that such activities are performed in an ad hoc way, with no real professionalism, and with no operational blueprint to guide actions. Consequently, practitioners are dissatisfied with the whole procedure, they believe there is an excessive requirement for information and documentation, that insufficient time is allowed for the entire tendering and procurement activity, and that this should be formalised into a systematic process. The outcome of the time pressure is that practitioners work in a constant rush and RM is not considered properly, with the result that risks are not managed.

In the sub-category (4) Only foreign firms exist, this is a consequence of the absence of local companies with sufficient expertise to complete mega IWPP projects. The fact that these foreign firms encounter a variety of difficulties emanating from the Saudi culture, government policy, being unable to identify unknown and known risks, a lack of knowledge of local work practices, lack of knowledge about project procurement systems, and lack of understanding of the legal and financial aspects, is simply another very large reason why risks abound in this

type of project. In appreciating that they will encounter such problems, these foreign companies inflate their costs in order to be on the safe side when the project is subject of delays. In this respect, they start from the assumption that the project will not be delivered on time and that they will be required to pay a penalty. Hence, that penalty is built into the original price.

Technology push modification as sub-category (5), emerges because of the relationship between project risk and project complexity. A project with new and emerging technology will have a high-complexity rating and a correspondingly high risk as is the case with IWPP projects which require sophisticated equipment for the desalination of sea water as well as for the production of power. The project management team should plan accurately and assign the appropriate resources to the technology managers to assure the accomplishment of project goals. The more complex the technology, the more resources the technology manager typically needs to meet project goals, and in the provision of each of those resources, many unexpected problems may arise. Indeed, as was explained earlier in Feature 1, sub-category 2, complaints were made about the inappropriate allocation of resources, with evidence of the distribution not being balanced nor resources utilised effectively. Furthermore, as IWPP projects have long lifecycles (20-30years), it is inevitable that new technologies will be continually appearing, both in the construction phase, and in the operational phase. Obviously, these new technologies will be more productive, thereby enabling top management to make reductions in the provision of certain other resources.

In sub-category (6) Lack of professionals in IWPP projects, it is considered as a big risk that the private sector is involved since private sector enterprises are forced to employ Saudi nationals in order to obtain government support for many aspects of their work. As has already been shown, however, Saudi nationals do not possess the required expertise, and therefore, there is a genuine threat to the professionalism with which these companies can execute their obligations. So there is a dilemma in as much as since the implementation of the IWPP approach, the government has encouraged private companies to share responsibility with the public sector for these mega-projects, but simultaneously it has introduced employment regulations to promote the Saudisation of occupations as a means of reducing

unemployment amongst its citizens. Hence, private companies are required to demonstrate their compliance with this localisation of labour initiative and employ a certain percentage of Saudi nationals, the majority of whom do not have the necessary skills and experience.

Any hint of failing professionalism can reflect badly on a firm, affecting its strategic growth, its economic position, its prestige within society, and its client relationships. Moreover, the actual absence of professionals in the workforce inevitably leads to poor management, project cost over-runs, and demoralisation of workers.

Subcategory (7) Poor management ability, in the context of IWPP projects, mainly refers to the management skills possessed by top leadership and/or board members. For example, time-sensitive decisions take longer than necessary to conclude, and this in turn impacts negatively upon critical activities, thus causing over-runs in time, and often, budget. Hence, it is important for those appointed to positions of leadership to possess professional management skills.

In respect of the skills possessed by the PM, it is known that whilst the hard skills can improve project performance, but the impact of these is less compared to the soft skills, and that soft skills are particularly helpful in facilitating the interaction between parties in projects with higher needs for co-ordination, and higher levels of complexity (Egeland, 2013), i.e., projects that are larger in size, with larger teams, or that have significant time pressures as is the case with IWPP projects. Moreover, these soft skills are particularly important in Saudi Arabia. Unfortunately, in IWPP projects in SA, managers face many problems in their possession of soft skills, and where they are not competent in this regard, RM implementation can be severely jeopardised.

As explained in Chapter Two (Section 2.9), the literature identifies a total of 89 risk factors in connection with construction projects, some of which apply to all projects, some being specific to WPP projects, and others pertaining only to IWPP projects. In this study, the researcher explored seven critical practical factors emerging from the grounded data provided by practitioners and established as specific to IWPP projects. These factors were identified

and confirmed by the most appropriate people to do this, and consequently, it can be assumed that these are valid, and represent extremely important issues in the construction and operation of IWPP projects in SA, and thus should receive more management attention throughout the entire lifecycle of such projects. Indeed, if the management's ability to plan accurately and more systematically were improved, some of these risk factors would be eliminated at the commencement of a project and the whole process would be better safeguarded. If, on the other than, RM is not considered seriously, the future will remain the same as the past, and projects will continue to fail.

Feature 6: Risk Management Tools

Clearly, RM is a key component of effective general management/project management. Without this, project success is unlikely. The RM process can be viewed in different ways. From the PM perspective it is common to consider planning, identification, classification, analysis, response, monitoring and control as the main steps. The important issue in this conception of the process is that these steps are interconnected and are part of a system, which means that each one should be properly addressed so as to enable an effective operation of the whole (Baloi, 2012).

Risk analysis aims to estimate or assess the likely outcomes or impacts of risks under consideration, in case they materialise. Deciding which courses of action to pursue is largely based on the results of risk analysis, since it is only after completing such an analysis that a risk response strategy can be formulated. Many risk analysis techniques and tools are available to assist the RM in this task, and not surprisingly, each one has strengths and weaknesses. Consequently, in making a choice of which technique(s) to use, RM/PM must consider the potential effectiveness of that choice in mitigating the risk concerned. Essentially, the technique which is most likely to capture the inherent uncertainty of the situation is the most appropriate.

However, frequently, the selection of a specific modelling and analysis technique is more governed by factors such as, familiarity, simplicity, and availability, rather than by the nature

of prevailing risks, and the power to describe uncertainty. And clearly, if selection is not undertaken with the correct criteria in mind, the validity of the outcomes is likely to be seriously affected, as also is the whole risk decision-making process. There are instances where qualitative techniques are more effective than quantitative, although the latter may appear to be the most robust and meaningful for many practitioners. (Baloi, 2012).

Of the variety of well-established tools and techniques used in managing risk in projects, Raz and Michael (2001) make a summary, and classify these into five groups according to the stages of the RM process as follows:

- Identification process (with tools and techniques including checklist, brainstorming, etc.),
- Analysis process (with tools and techniques including risk probability assessment, risk classification, etc.),
- Planning process (with tools and techniques including responsibility assignment, cost-benefit analysis, cause and effect analysis, etc.),
- Control process (with tools and techniques including analysis of trends, project re-planning, etc.), and
- The background process (with tools and techniques requirement management, prototyping, training programs etc.)

It has already been strongly indicated that in SA generally, there is a lack of knowledge and skill within the construction workforce in the area of RM. Furthermore, in the precise area of IWPP projects, where this type of expertise is perhaps most demanded because of the complexities associated with large-scale collaboration, RM abilities are missing. Consequently, the sophisticated nature of the tools and techniques for assessing and management risk are of little use since the individuals within the participating IWPP organisations simply do not know how to use them. It is true that these tools are in place within the industry since they are used by the international companies partnering the Saudi

organisations, but until the level of knowledge and skill is raised among Saudi practitiones, such techniques will not be implemented. The capability must be developed in this respect.

Feature 7: Policy

The feature of Policy refers to the business and strategic decisions taken by the leaderships of governments, organisations, and companies. There are various definitions of political risks. Among these, Howell (2001) is regarded as the best representative. He explains political risk as political decisions, political events or societal events in a country that have the potential to influence the business climate, and thus can lead to investors losing money or receiving less return on their investments than they had expected when the investment was made. Political risk includes inconsistency in policies, changes in laws and regulations, restrictions on fund repatriations, and import restrictions (Ozorhon et al., 2007).

Researchers explain policy as a statement of intent, and is implemented as a procedure or protocol. Policies are generally adopted by the board or senior governance body of an organisation, and in turn, procedures and/or protocols are developed and adopted by senior executive officers who are under the direction of the board.

Even under PPP arrangements, as is the case with IWPP projects in Saudi Arabia, protective structures, and private-risk takers and their management techniques, are introduced too late to the process to influence RM (which includes risk allocation), and hence, they cannot undo the mistakes already embedded in the projects. One crucial consequence is an increase in the cost of financing PPP projects and a greater need for sovereign guarantees or multilateral-agency support. In the end, however, society at large bears the costs of failures or over-runs, not least in the form of missed or slowed growth, and represents a major policy failure (Beckers et al., 2013).

In the context of IWPP projects, which have required a partnership between the public sector and the private sector, to support the financing, design, development, construction and operation of water and power projects, a policy had to be formulated since the IWPP approach

is considered as a relatively new avenue to development in Saudi industry. Consequently, the associated policy is changeable as it responds to the outcomes of trial and error, and a new official organisation has just been established as a semi-government entity, called the Water and Power Company (WEC) which has responsibility for all IWPP issues, including the determination of policy and process.

As an important element of the continuing national development, the Saudi government encourages the local companies to participate in these projects, and as a further support, these companies receive priority over foreign ones in respect of receiving supplies and in other areas of operation. However, practitioners consider this encouragement to lead to compulsion, and this is seen as leading only to project failure as IWPP projects are complex and essentially local companies are not yet ready because of all the various issues mentioned in the categories and sub-categories identified. Basically, this is the fault of poor planning.

To summarise the second phenomenon (Inadequate planning), the five features highlighted will be welcome additions to the literature in the context of IWPP projects in SA as they are all extremely pertinent to the effort to secure effective RM implementation.

5.7 Phenomenon 3: Inadequate Monitoring and Evaluation

Project monitoring and evaluation is required within the overall reporting process associated with project management (as mentioned in Phenomenon 2 – Feature 6), and if there is inadequate monitoring and evaluation for whatever reason, the RM process will be negatively influenced.

There is growing recognition amongst practitioners and scholars that well-designed monitoring and evaluation systems are integral to good PM (Margoluis, 2005). However, one notable problem with organisations in SA is that they are still in their relative infancy, and still trying to build their systems. Unfortunately, in their efforts to develop they are overlooking the many lessons that could be learned by referring to the experience of others before them, and therefore their attempts to create useful and practical monitoring and

evaluation approaches flounder as they do not take advantage of what is already known to work and fail. This phenomenon seems to be occurring in IWPP projects.

Inadequate monitoring and evaluation is comprised of the following emergent features:

- Stakeholder Management
- Lesson Learned

Feature 8: Stakeholder Management

The following emergent sub-categories are clustered to make up this feature (Stakeholder Management):

- Ineffective communication
- Different priorities
- Inappropriate selection process
- Lack of relevant expertise

According to Weiss (2006), a stake is a share or an interest in a project, and a stakeholder is an individual with a stake. Freeman (1984) defines the term stakeholder as any group or individual who can be affected by the achievement of the firm's objectives, and Moloney (2006) defines stakeholders as groups or individuals that benefit from an organisation. Stakeholders influence, and are influenced by an organisation and its activities. Hence, they can influence an organisation's aim, functioning, development, performance, and even survival.

Clearly, stakeholders can be beneficial to an organisation, when they assist it in achieving its goals; but, they can also be detrimental when they oppose the organisation's mission. Fundamentally, stakeholders have power to be either a benefit or threat to an organisation (Gibson, 2000).

According to Karlsen (2002), the poor management of stakeholders can cause many negative impacts in construction projects, such as poor scope and work definition, inadequate resources being assigned to the project (both in terms of quantity and quality), poor communication, changes in the scope of work, and unforeseen regulatory changes.

In understanding the specific priorities of the project's most important stakeholders, the PM and his team must understand what are the areas that the most important stakeholders want to focus upon, and see improvements being made in, and which area(s) they are willing to sacrifice to facilitate those improvements.

Researchers in the construction industry such as Newcombe (2003), and Olander (2006), have realised the significance of stakeholder management in construction projects and have, therefore, paid more attention to it. In the construction industry generally, each project consists of various complex activities, which means each stakeholder has different levels of interest, priorities and power in the project in which they are involved. Project success or failure is strongly affected by both the perceptions and expectations of its stakeholders (Bourne, 2005).

According to Chinyio and Olomolaiye (2010), stakeholders can be grouped by different criteria and some of these criteria are discussed below:

a. According to Calvert (1995) and Winch and Bonke (2002), the stakeholders in a project can be divided into:

- Internal stakeholders, that is, those who are involved in the project or who provide finance (e.g. clients, consultants and contractors).
- External stakeholders, that is, those influenced by the project in a significant way (e.g. neighbours, government authorities and local community).

b. Stakeholders can be internal or external to the project team or project scope (Sutterfield et al., 2006).

c. Other classifications are inside and outside stakeholders (Newcombe, 2003).

d. Similar types of stakeholder are direct and indirect (Smith and Love, 2004).

e. A different classification is that suggesting primary and secondary stakeholders (Carroll and Buchholtz, 2006).

The importance of effective stakeholder management in PPP project success has been illuminated by Olander and Landin (2005), who indicated how a failure to understand and manage external stakeholders has dramatically delayed railway infrastructure projects. Additionally, there are other surveys which demonstrate that coping with external stakeholders is perceived as imperative to project success (Calvert, 1995).

Stakeholders' impact can be small or great, and can be exerted incidentally or deliberately. Chinyio and Olomolaiye (2010) argue that organisations and individuals within them need to be wary about their stakeholders and their impact. They suggest that stakeholders must be managed effectively in each project, since different stakes in a project can be a major source of conflict between them. Hence, the possible negative impacts of such occurrences must be appreciated, and efforts made to reduce these right at the start by attending to the need to manage different stakeholders.

In fact, many researchers have come to believe that stakeholder relationship management is imperative in the construction industry. Cleland (1986) and Jergeas et al. (2000), for example, argue that a well-organised management of the relationship between the stakeholders and their project is a significant requirement for project success, and Aaltonen et al. (2008) claim that the key ingredient of successful project stakeholder management is the efficient management of the relationships between the project and the stakeholders themselves.

IWPP projects generally involve a large number of different stakeholders and these parties enter the project life cycle at different stages with different roles, responsibilities, risk-management capabilities and risk-bearing capacities, and often, conflicting interests. While the complexity of these projects does indeed require the division of roles and responsibilities among highly specialised players (such as contractors and consultants), this inevitably leads to significant interface risks among the various stakeholders that materialise throughout the lifecycle of the project, and these must be anticipated and managed from the outset. In the case of SA, this is not properly anticipated and managed from the beginning of IWPP projects as discussed earlier in this chapter, the consequence of which is the emergence of the sub-categories comprising this feature as outlined. Above all, IWPP parties must ensure they manage the expectations of the various stakeholders to be guaranteed of their continued support, and so as not to instil any idea of failure. Ultimately, it is the stakeholders who declare a project to be successful or otherwise.

Feature 9: Lesson Learned

This emergent feature is made up of two sub-categories:

- Ineffective PM methodology, and
- Project failure cause

Lessons learned processes have been deployed in commercial, government, and military organisations since the late 1980s to capture, store, disseminate, and share experiential working knowledge (Aha and Fernandez, 2001). This can be defined simply as a post–project review. It is one opportunity to systematically improve performance in subsequent projects.

Furthermore, lessons learned the hard way on past projects are, if nothing else, risks for future projects. Project teams are empowered when they know that each issue raised during the post-mortem process must be added to the risk database and evaluated methodically in each subsequent project.

In the context of IWPP projects in SA, post-project reviews do not generally take place, but in the unlikely situation when they do, they are typically constrained by lack of time and attention as well as lack of personal interest, tools, and ability. They focus mostly on technical output and bureaucratic measurements; process-related factors such as PM are rarely discussed as explained earlier in the consideration of the poor management of risk.

Furthermore, there is no process in the Saudi Arabian industry to record the lesson learned, and hence, issues that have caused problems, and their antecedents, are not known in any formal way. The dependency is on the personal memory of experts who were either deployed on previous projects or who have heard second-hand, and this is a poor strategy to preserve information, since when such individuals resign or even die, their knowledge and understanding is lost for the future. Formal knowledge transfer is critical in this situation, and an accurate database must be constructed for the benefit of subsequent projects, particularly those with large numbers of inherent risks as is the case with the IWPP approach.

5.5 Implementing Good RM Practices in IWPP Projects in SA

In order to implement sound RM practices in any project, a framework that introduces and ensures the effective application of formal processes in day-to-day work from the start to the finish of that project, is necessary (Beckers et al, 2013). Such framework must highlight the most critical issues in the project and ensure complete awareness among all those involved of these issues, well before the actual commencement of the project. This type of involvement in the pre-construction phase is more likely to obtain commitment from all the parties to adhere to the framework.

In IWPP projects, which as noted are characterised by a whole range of unique risks, a strong framework involving the use of robust practical approaches and tools will help IWPP parties to manage risks more proactively, and thus, more effectively. Furthermore, proper front-end project planning is very much concerned with shaping the project's risk profile so it can be managed effectively as planned; and as part of this planning, is a discussion of which are the best practices and processes to apply to achieve these outcomes.

In this respect, it can be understood that the attempt to apply good RM practices which have been tried in tested in one context, may not be successful in an environment that remains in a state of unreadiness, as is the case in Saudi Arabia since the organisational/management infrastructure to support the operation of those practices does not exist. In these circumstances, project teams will simply be demoralised and demotivated as they try to implement RM practices that do not have a chance of being successful.

It is clear that as presented in the literature, good RM practices are available and are applied successfully in many industries. However, in the context of IWPP projects in SA, the support (in the way of structures and skilled personnel) is not in place to enable the implementation of these practices, and this reflects yet one more time on the need to raise awareness of RM, and of the need for it, so that the Saudi environment can facilitate the introduction of good practice.

What has emerged from the research is the knowledge that there is at least a foundation on which PMs of IWPP projects in SA can build in respect of trying to apply the practices and tools that can benefit the industry, since overwhelmingly, the practitioners involved in the study recognise the need for progress in this direction. They also acknowledge the culture clashes arising from the involvement of different stakeholders as they bring their varied ways of working, and different priorities. Likewise, they appreciate the need to implement robust RM practices that will generate insights into the root causes of risk, and enable to development of forward-looking, life-cycle-oriented risk assessment strategies right at the beginning of all projects.

Clearly, there is an urgent need for strong risk-management processes from the outset of an IWPP project and for these to be applied and continuously developed throughout the life of the project. These processes would include the identification of which parties should be accepting responsibility for which risks, and would therefore ensure that accountability was placed appropriately.

5.8 Summary

This chapter has discussed the three major phenomena emerging from the GT exercise that influence the implementation of RM in IWPP projects. In doing this it has highlighted the categories and sub-categories identified by the practitioners, and considered how the issues raised affect the behaviour of all individuals in all IWPP parties towards risk. Essentially, the chapter concludes that: the uniqueness of the Saudi Arabian culture negatively influences the behaviour of people and society at large, the high subsidies paid by the government to consumers and organisations have a negative impact on the way individuals and organisations perceive the need for RM, and the lack of attention paid to RM by top managements prevents the development and spread of RM knowledge and understanding. Shortcomings in both the theory and practice of RM within IWPP operations have been brought to light through the reviews of these major issues.

On the basis of this thorough discussion of the grounded data, the model has been drawn, from which it is seen that in order for robust RM practices to be implemented within IWPP projects in SA, the government, industry, and top managements must make several improvements to the existing management infrastructure to enhance the overall readiness of the industry to adopt RM practices that are known to be successful.

The following chapter draws the thesis to a close, offering an overall conclusion and recommendations.

CHAPTER SIX: CONCLUSION AND RECOMMENDATION

6.1 Introduction

The Risk Management (RM) phenomenon examined in this study has been situated in the precise context of IWPP projects in Saudi Arabia, where currently, there is no evidence of effective management of risk. This is despite the knowledge that WPP projects following the IWPP approach have typically involved a large number of risks of differing types and magnitude, as they have been reliant on long-term arrangements to transfer project risks, traditionally borne by the government, to the private sector. The only way to help meet project objectives is to institute effective RM, and the efforts made through the data gathering and analysis have sought to determine what prevents the implementation of good RM practice and how any barriers identified can be removed.

The main findings are summarised in this chapter, and the way in which the research aim and objectives is thus presented. Additionally, the contribution to knowledge is outlined, some limitations of the study are highlighted, and recommendations are offered for further research.

6.2 Main Findings

In Saudi Arabia, there has been no successful application to date of formal RM throughout the diverse stages of construction projects in SA (Falqi, 2004). Furthermore, there have been no studies to establish how RM in any form is practised in WPP projects. This is a serious shortcoming since SA is in dire need of these utilities, and the success of all new WPP projects is of vital importance, so reasons for their failure in the past should be properly established and eliminated. Moreover, as the trend is now to involve the private sector in the provision of public utilities, the

fact that no studies focusing on PPP arrangements in the water and power industries have been undertaken enhances the level of ignorance of RM in this particular area. Of course, this latter omission may be attributable to the short history of IWPP projects in SA, but irrespective of the reason, given the complexity of such projects, and the known informality with which risk is considered in them, the current study is important in trying to illuminate current practice and its deficiencies.

As an approach that is appreciated to provide insights and answers when there is little literature to use as the basis for theory-building, Grounded Theory has been used to arrive at definite phenomena, categories and sub-categories of phenomena that impinge upon attempts to introduce effective RM processes in IWPP projects in SA. This methodology has been able to offer a sensitive and rigorous approach to the investigation, as a result of which a propositional model that is fully grounded in practitioners' experiences has been constructed. This model acknowledges the role played by three major phenomena and nine categories and 26 sub-categories of those phenomena, in preventing the effective implementation of RM in IWPP projects in SA. The model is of use to practitioners and decision-makers wishing to promote a more enabling environment in which to introduce RM. The development of the model is the result of the following findings:

- The existing literature reveals that the implementation of RM in construction projects in SA is informal. There is no published research specifically concerning RM in IWPP projects in SA, but it can be legitimately assumed that as these projects fall under the wider umbrella of construction projects, the same will hold true.

- The practitioners involved in the study confirmed the observations in the literature that RM in the Saudi construction is practised informally. They also identified the reasons why RM implementation in IWPP in SA follows this pattern, citing these as being: SA suffers from a lack of knowledge and experience of RM, government officials assume that the application of RM requires more time, resources and knowledge, and do not promote this, the desperate needs for water and power in SA and the extreme demand on these services leads to project parties focusing on the construction of the project

without spending sufficient time preparing the specification, and in the planning and tendering stages there is a lack of RM training available for staff within all project parties, there is a shortage of qualified local contractors and consultants, foreign firms lack knowledge of the SA industry, and there is a no relevant research about RM in WPP projects in SA.

- The practitioners involved in the study believed that the effective implementation of RM processes has the ability to prevent WPP/IWPP project failures, which are ultimately caused by poor RM; and they considered effective RM to be possible only if the entire process is implemented formally.

- Some risk factors are general for all construction projects, some are specific to water and power projects, and some for only IWPP projects, but they are all similar in their level of importance. From the existing literature, 89 risk factors were identified (32 for construction projects, 28 for PPP projects, and 29 risk factors specific to WPP). During the interviews with practitioners, seven practical risk factors specific to IWPP projects were explored as follows: Poor linkage with water transmitting system; Poor technology push modification; Lack of professionalism in IWPP projects; Poor management ability in IWPP projects; Only foreign firms exist in IWPP projects; Insufficient time for tendering; and Unclear definition of IWPP project scope. The study provided a deep understanding of the causes of these risk factors.
- The practitioners involved in the study stated that IWPP projects entail a plethora of risks because of their following characteristics: Unique risks specific to this approach; more than five organisations are working together for a long time; each organisation has its own goals; complex structures and processes; each organisation has different policies and culture; social sensitivity is usually associated with this type of project; and the water and power sector suffers from a lack of experience in IWPP undertakings.

- The practitioners involved in the study stated that barriers to the implementation of RM in a formal way are: SA suffers from the lack of RM knowledge and experience; government officials assume that the application of RM requires more time, resources

and knowledge, and that there are no additional benefits to be gained from RM; the lack of water and power in SA and the extreme demand on these services leads project parties to focus on the project without spending the appropriate time on RM; there is a lack of RM training for staff in all project parties; there is a shortage of qualified local contractors and consultants; the government organisations present obstacles to the proper application of RM.

- The practitioners involved in the study stated that the RM behaviour of all individuals in all IWPP parties towards risk is affected by the following: the uniqueness of the SA culture which predisposes people and society at large to hold certain attitudes towards risk; the government policy of paying high subsidies to consumers and organisations which influences the way individuals and organisations behave in respect of RM and causes them not to take responsibility for managing risk; and the low level of attention paid to RM from top managements, which results from s lack of RM knowledge and the two previous problems (cultural predispositions, and government bail-out), and which promotes an organisational culture that discourages individuals from anticipating and managing risk.

6.3 Meeting the Research Aim and Objectives

Being based on the three principal subjects of Risk Management (RM), Water and Power Plant (WPP) projects, and Public Private Partnership (PPP) in the global context, all in the context of Saudi Arabia, the study has sought to explore these areas in an integrated and holistic way as a means of enhancing the performance of IWPP projects in terms of time, cost, and quality, and thus fostering overall success.

The main objective of PM is to maintain a good balance between the three conventional objectives of any construction project (cost, time and quality), and anything that may threaten the achievement of these objectives and prevent the PM from meeting such targets is considered a risk to the project.

Based on the principle that RM is an effective project management tool that minimises the impact of project threats and seizes the opportunities that occur, the primary aim of this research was to devise an organised procedure for the effective management of risks in IWPP projects in Saudi Arabia.

The research aim was achieved through meeting the six objectives as described below:

Objective One: To establish the current levels of Risk Management knowledge and implementation in the Water and Power Industry in Saudi Arabia:

The current literature has shown that no feasibility studies to assess the practice of RM in WPP projects in SA have been undertaken, nor has there been any study regarding the practice of RM in IWPP projects in the SA context (As discussed in sections 2.9, 2.10, and 2.11). The relatively short history of IWPP projects in SA may be the cause of this lack of research, but regardless of this short history, it has been shown that such projects are extremely complex by those who have explored the nature of PPP in the water and power industry, and it has also been shown that in the more general context of Saudi construction projects, RM is practised in an extremely ad hoc manner. Hence, Objective One has a very specific, and so far, unresearched focus.

Interview sessions were held as a means of meeting this objective. In this respect insights were elicited from individuals, some with very long experience, who have been involved in the RM processes in their respective organisations. The GT approach to the collection and analysis of data, which offers a sensitive and rigorous method for investigation was applied in the study, the result being an accumulation of rich qualitative data from which it has been possible to achieve a deeper understanding of how the RM process currently in operation is perceived by practitioners.

The findings demonstrated that RM implementation in Saudi Arabia's water and power industry is not implemented in a formal way, and several reasons were advanced for this

as presented in Section 6.2. The identification of these reasons thus achieves Objective One

Objective Two: To identify risk factors that affect IWPP projects in terms of Time, Cost and Quality:

IWPP projects are more risk-intensive in the areas of finance, execution, completion, operation, market, politics, and the environment, than are other construction, and WPP projects. Some of the risks faced by this kind of project are unique and not found in other construction undertaking, and with this uniqueness comes a challenge, as would happen in any industry (Wolfs and Woodroffe, 2002). The reasons why IWPP projects are regarded as particularly risky are as follows: they require multiple, complex interdependent agreements between multiple private and public sector parties; they have a long lifecycle; they require huge investment with high upfront costs; they have a long payback period; they require considerable effort in the developmental stages due to their complex structure and process; they are subject to political and economic risks; and they involve a complex contract mechanism involving many participants with diverging interests, which can impose limitations on the project (Thomas et al., 2006).

Clearly, it can be seen that the literature was able to offer certain insights in respect of Objective Two. Indeed, within the literature, of the 89 risk factors identified, 29 of these were specific to WPP projects, 28 to PPP projects, and 32 to construction projects generally. Given that IWPP projects fall into all three categories, it can be understood that there was much of relevance in the literature to this objective. However, the study also investigated this issue with practitioners, and through the GT methodology, it was possible to distil seven practical risk factors specific to IWPP projects in SA as shown in Section 6.2. Hence, Objective Two has been achieved.

Objective Three: To determine the barriers to RM implementation in IWPP projects in SA and identify the enablers that could overcome the barriers and improve implementation:

This objective was achieved by investigating the existing process of RM implementation in IWPP projects with practitioners. As with the previous objective, the use of the GT approach enabled several rounds of analysis of the data (consideration/re-consideration, compare/contrast) such that the barriers preventing effective RM implementation, and thus precipitating failure were identified as detailed in Section 6.2. Objective Three was, therefore, achieved.

Objective Four: To enhance the understanding of how the effective implementation of RM in IWPP projects leads to the achievement of project goals, and of how to produce an effective RM process:

The objective was fulfilled through a review of the extant literature and by the interview sessions conducted with practitioners. As with the two previous objectives, the GT methodology allowed for a deeper understanding to be secured, and for the development of theory. That theory involves the need for a formal system including the allocation of responsibilities and obligations for the management of risk.

It was highlighted that the practice of RM in the Saudi water and power industry was minimal, that no genuine and comprehensive attempt was ever made to establish risk registers in the initial stage of a project, nor during a project, and that there were no designated individuals to champion the management or risk.

The following are ways in which the industry can establish an effective RM process:

- Embed RM as an integral part of the project, and something that is undertaken as part of the day-to-day operations. Stakeholder support is very important to achieve a successful RM process. It is a good practice to ensure that there are demonstrable benefits to illustrate this approach.

- Identify Risks. The identification of risk is most effective when done very early in the project. A brainstorming session with team members and stakeholders to list several potential risk items is a good beginning. The aim should be to include all potential

risks, including the risks those that are already known and assumed, such as scope creep.

- Identify not only the threats, but also any opportunities that may arise within the project, as these may assist in bringing the project in on schedule, perhaps with better deliverables and/or increased profitability.

- Ensure effective communication at this stage and all stages are crucial. Including the communication of risk as part of all meetings is effective in illustrating the importance of RM, sharing the risk potentials, and providing a platform for discussion.

- Assign Ownership. Decide who is going to be responsible for different risks. Designated individuals will then be accountable and work to identify the possible triggers to their assigned risk. Assigning ownership is also important in establishing effective and clear communication channels since all involved in the project know whom to call when questions arise.

- Estimate or Prioritise Risks. Once risks are identified, the likelihood of the threat being realised should be assessed. Some risks will have a much higher impact. One approach to estimating the risk is to make a best estimate of the probability and multiply this by the amount it will cost to set things right, if it happens. This will provide an impact value associated with the risk. Another approach is to assign each risk a numerical rating, such as a scale from 1 to 10, and to focus on the biggest risks and the lesser priority risks as applicable.

- Analyse the Risk. The different causes of risks and the circumstances affecting their likelihood should be established, and a simulation to illustrate how likely the project is to finish on a specific date or at what cost should be made. Gaining a sound understanding of the risk is a solid foundation for an effective proactive response and provides insights to manage the risks.

- Manage the Risk. Plan and implement a response for each risk. Typically there will be four options – Transfer the risk (sub-contracting scope or adding contractual clauses), risk avoidance (eliminating the source of the risk, such as changing a vendor), risk

minimisation (influencing the impact), and risk acceptance. Create a contingency plan for the largest risks. This would encompass all actions taken if a risk were to occur.

- ❖ Create a Risk Register. This will enable progress to be monitored and risks to be controlled. A good risk register or log will include a risk description, ownership, the analysis of cause and effect, and the associated tasks. A good risk register is a valuable tool in the communication of project status, and should maintained and updated. By remaining current and up to date, the risk register will be viewed as a relevant and useful tool throughout the project lifecycle.

Once a solid effective risk management implementation process is established, it forms the basis for crisis prevention and project success. Risk management involves adapting the use of existing resources, contingency planning, and resource allocation, but the process need not be complicated, and by implementing such a process at the start of each project, the team can prepare for whatever may occur and maximise the project results, ensuring that the benefits of time, cost and quality can be achieved with minimal interruptions (Medica, 2012).

Objective Five: To determine the factors affecting the attitudes of people in all IWPP parties in SA towards risk:

This objective was achieved entirely through the GT exercise with the twenty-one interviewees. Questions were asked pertaining this issue and practitioners were allowed to offer their own explanations. The various aspects identified are presented as follows:

- ❖ The practitioners involved in the study stated that the RM behaviour of all individuals in all IWPP parties towards risk is affected by the following:
    - the uniqueness of the SA culture which predisposes people and society at large to hold certain attitudes towards risk; this could be overcome by educating people formally and informally.

- the government policy of paying high subsidies to consumers and organisations which influences the way individuals and organisations behave in respect of RM and causes them not to take responsibility for managing risk; this could be overcome by gradual reduction to subsidies and educating people about actual market prices.
- and the low level of attention paid to RM from top managements, which results from s lack of RM knowledge and the two previous problems (cultural predispositions, and government bail-out), and which promotes an organisational culture that discourages individuals from anticipating and managing risk.

Objective Six: To develop a model which reflects the critical factors leading to the ineffective implementation of RM in IWPP projects in SA:

Having gathered and analysed data from the literature and the empirical exercise with the twenty-one practitioners, the research developed the model presented as Figure 5.1.

This model is comprehensive, valid, and will enable practitioners to learn from past experience, and decision-makers to promote a more enabling environment in which to implement RM in IWPP in SA.

6.4 Contribution to Knowledge

The findings from this study make several contributions to the current literature. The main one is the model which has been developed from data grounded in practitioners' experience, and that can thus be regarded as valid and reliable within the Saudi IWPP context, and possibly by extension to other countries sharing similar cultural traditions to Saudi Arabia.

The model highlights the influence of three major phenomena, nine categories, and twenty-six subcategories on the implementation of RM in IWPP projects in SA, and therefore represents both a comprehensive account of barriers to project success, and a blueprint for effective RM at the same time. The model is the first to be proposed concerned RM in IWPP projects in the Saudi context, and can, therefore, be used as a grounded basis on which organisations in this industry can build. The model also represents a gathering of lessons learned from past experience, none of which have been previously articulated and preserved in any way other than in the memories of experts. As a formal recording of these lessons learned, the model will help decision-makers to promote a more enabling environment in which to implement RM. Consequently, the study outcome adds to the growing body of literature on RM in the water and power industry.

In developing the model, the study also contributes to the knowledge on the level of RM development in the water and power industry in SA. To date only general perceptions of the development of RM in this specific context have emerged, but this study has made a reliable measure of this through its GT methodology, and consequently, it can provide a solid platform future studies concerned with enhancing the appreciation of current RM practices in IWPP projects.

With its focus on the IWPP mechanism, the study has also contributed by analysing the concept of IWPP in the context of the water and power industry. It has explored unique practical risk factors specific to IWPP projects, identified their causes, why these projects entail so many risks, and how such diversity can be managed. Consequently, it has enhanced the current understanding of RM practice in WPP projects, and provided IWPP parties with a better appreciation of risk in SA. Furthermore, it has identified the value of RM, and confirmed that its effective implementation has the ability to prevent failure in IWPP projects.

6.5 Limitations of the Research

As with all research studies, so too this one has a number of limitations, but essentially these are unavoidable given the design choices made.

The GT methodology implied the collection of qualitative data and therefore, the number of interviews conducted remained at twenty-one. It may have been that more interviews would have yielded new data but this is not likely since it was evident that saturation point had been reached. Nonetheless, with the knowledge and understanding obtained, the way is clear for a bigger study using a quantitative approach.

One important outcome of the research was the blame laid with top management for the organisation failures in respect of generating a risk culture and promoting the development of RM skills, and the feeling of risk ownership. The omission from the interview sample of very senior managers prevented this kind of exploration with those deemed to be at fault. Hence, a larger sample would provide more information and increase the confidence in the findings.

The focus of this study is on IWPP projects in SA, and it is accepted that these are unique undertakings for the very many reasons indicated in the thesis, not least because of the Saudi culture. Consequently, generalisation of the findings may not be easily made to IWPP projects internationally. That said, the findings may well be generalised to other countries in the Middle East.

Finally, it might be thought that as the data was collected in different cities in Saudi Arabia (Riyadh, Jeddah and Dammam), and large amounts of time were spent in travelling, the study may have benefited from a concentration on one city, which might have generated a higher overall total of interviews. This is not the researcher's opinion, but it might nonetheless, be suggested as a limitation.

6.6 Recommendations for Future Research

Directions for further research naturally flow from the limitations of the study, and are suggested as follows:

a. Given the current study's focus on WPP projects and its particular emphasis on IWPP projects, there is room for the model presented, and the methodology applied to be used in a study of other types of infrastructure project in SA. Such a study could reveal RM practices and identify differences in the performance of these projects, and in the structure of risk across sectors.

b. The research has highlighted three fundamental phenomena grounded in the ineffective implementation of risk management in IWPP in SA. Any one of these phenomena could be further explored using the GT methodology to expand the model.

c. The methodology applied in the study could be replicated with a different sample of interviewees, specifically top management and government officials, since this study has identified the role played by this layer of senior management and policy-makers in preventing the growth of a risk management culture.

d. The model developed via the GT methodology could be used as the theoretical framework for a bigger, quantitative study using a questionnaire survey with a larger number of companies and a greater geographical spread, and with a focus on WWP projects rather than only IWPP projects given the small number of these so far in operation.

6.7 Publications

Three refereed international conference papers have been produced from this research (**Appendix D**). Additionally, two international conferences have accepted the first draft of a paper which has yet to be finally approved. Furthermore, a prestigious journal has accepted the paper for publication, it will be published in July issue. As the researcher applied the GT methodology for this PhD study, a large volume of rich data remains available to him, thereby providing the opportunity to produce more papers and contribute towards the body of knowledge in the field.

6.8 Final Comment

This study was undertaken as a means of discovering new knowledge aimed at assisting parties in the IWPP projects in Saudi Arabia, to achieve their objectives. It has been successful in that respect and left the door open for further academic effort to develop this line of enquiry. However, the study has also been beneficial for the researcher in as much as it has allowed him to perform an investigation adopting a methodology that is little used by social science researchers these days. Grounded Theory as that methodology has provided the researcher with new insights into data collection and analysis, and the confidence to perform similar studies in the same way. The activity of producing categories, and sub-categories was found to be challenging as it was often possible to place one feature in more than one sub-category. Nonetheless, the challenge associated with the study was an enjoyable one, and the outcome that firm and valid guidance can be given to Saudi practitioners for the good of the country's development is worthwhile.

References

Aaltonen, K., Kujala, J., and Oijala, T. (2008) Stakeholder salience in global projects. *International Journal of Project Management*. V. 26, pp. 509–516.

Abdul-Aziz, A.R. (2001) Unravelling of BOT scheme: Malaysia's Indah Water Consortium, *Journal of Construction Engineering and Management*. V.127 (6), pp. 457-460.

Abowitz, D. A., and Toole, T. M. (2010) Mixed method research: Fundamental issues of design, validity, and reliability in construction research. *Journal of Construction Engineering and Management*. V.136 (1), pp.108-116.

Adams, F. K. (2008) Construction Contract Risk Management: a study of practices in the United Kingdom. Cost Eng. V. 50 (1) pp. 22–33.

Agar, M.H. (1996) The Professional Stranger. Second Edition. New York: Academic Press.

Ahmad, Z. (1984) Development of new materials for desalination. *Anti-Corrosion Methods and Materials Journal*, V. 33 (1), pp. 4-13.

AIRMIC, ALARM, IRM. (2002). A Risk Management Standard.

Akintoye and Macleod (1997) Risk analysis and management in construction, International *Journal of Project Management*, V. 15, (1), Pp. 31-38.

Al-Deffeeri, N. S. and Al-Thafiri, F. A. (2005) Recarbo national strategy is an innovative technology in Kuwait. *WSTA Seventh Gulf Water Conference: Water in the GCC- Towards an Integrated Management*. V.11. pp. 957- 972.

Al-Ghafly, M. A. (1995) *Delays in the construction of public utility projects in Saudi Arabia*, Unpublished PhD thesis, CEM Dept., KFUPM, Saudi Arabia.

Al-Ghamdi, S. M. (2008) International Business Practices in Saudi Arabia: Cultural effect. Management of CIM Programs.

Al-Mutaz, I. S. (1991) Operation of dual purpose MSF plants at water/power peak demand. Institution of Chemical Engineers Symposium Series, V. 4, (125), p. 105. Malta.

Alotaibi, S. (2009) *Effective Management: Explaining Project Management in Saudi Arabia.* Unpublished MSc thesis, SBE, Heriot Watt University, UK.

Al-Shaikh, A. and al-Harkan, A. (2005) Water Privatization Learning From different case Studies. *WSTA Seventh Gulf Water Conference: Water in the GCC- Towards an Integrated Management*. V.1. pp. 49-68.

Amaratunga, D. and Baldry, D. (2000) Theory building infacilities management research: case study methodology, Proceedings of the Bizarre Fruit Postgraduate Conference University of Salford, Salford. Pp. 107-23

Angen, M.J. (2000) Evaluating interpretive inquiry: Reviewing the validity debate and opening the dialogue.

Antunes, R. and Gonzales (2015) A Production Model for Construction: A Theoretical Framework.

Arab News (2012) The Real Estate Summit – Published- Cityscape, Riyadh.

Arain, F. M., Pheng, L.S. and Assaf, S.A. (2006) Contractors' views of the potential causes of inconsistencies between design and construction in Saudi Arabia. *Journal of Performance of Constructed Facilities*.

Awerbuch, L. (2003) Energy is Power, Power is Water, Water is Security. Presented at European conference on Desalination and the Environment- fresh water for All in Malta.

Awerbuch, L. (2005) Power and Water Integration Innovation in Hybrid and Nano filtration. WSTA Seventh Gulf Water Conference: Water in the GCC- Towards an Integrated Management. V.11. pp. 933-956.

Awerbuch, L. (2009) Future Direction in Integration of Desalination, energy and the Environment. American Nuclear Society, Boston.

Awodele, O. (2012) Framework for Managing Risk in Privately Financed Market Projects in Nigeria. Unpublished PhD Thesis, Heriot Watt University. UK.

Baker, S., Ponniah, D., and Smith, S. (1999) Risk response techniques employed currently for major projects. *Construction Engineering and Economics*, V.17, pp. 205-213.

Bala, M. (2005) Data Collection Procedures – Online Research Methods for Teachers and Trainers.

Baloi, D. (2012) Risk Analysis Techniques in Construction Engineering Projects - *Journal of Risk Analysis and Crisis Response*, Vol. 2, No. 2.

Beakley, G.C and Chilton, E.G (1974) Design – Serving the Needs of Man. New York, Macmillan.

Beckers, C., Flesch, M., Silva, and Stegemann (2013) A risk-management approach to a successful infrastructure project - McKinsey Working Papers on Risk, Number 52.

Berechman, J. (2010) The Evaluation of Transportation Investment Projects, Routledge, pp 182.

Berger, P.L and Luckman, T. (1967) The Social Construction of Reality – A Treatise in Social Knowledge. London: Penguin.

Best, J and Khan, J. (1989) Research in Education. Englewood Cliffs (NJ), Prentice Hall

Betraoui, Y (2012) Land Sterling, Saudi Arabia, Cityscape Seminar, Riyadh.

Betts, A., Leibbrandt, S. and Heehyul, M. (2011) Cultural & Contextual Perspectives on Development Risk and Well Being.

Bhattacharyya, S. C. and Dey, P. (2007) Managing risk in a large rural electrification program in India. Impact Assessment and Project Appraisal, 25(1), pp.15-26.

Bing, L., Tingo, R. L., and Chew, D. (1999) Risk Management in International Construction Joint Venture. *Journal of Construction Engineering and Management*. ASCE, pp 277-284.

Birnie, J. (1999) Private Finance Initiative (PFI) – UK construction industry response.

Blaxter, L., Huges, C., and Tight, M. (2000) How to research. 2nd Edition, Open University Press, London, UK.

Borsani, R and Ghiazza, E (2004) Combined Power and Water - Collaboration and Optimisation - key elements in IWPP development (Fisia Italimpianti), Wilson, P (PB Power).

Bourne, L. (2005) Project relationship management and the Stakeholder Circle TM. Unpublished PhD thesis, RMIT University. Australia.

Bouzayani, N.; Galanis, N. and Orfi, J. (2009) Thermodynamic analysis of combined electric power generation and water desalination plants. *Applied Thermal Engineering Journal.* V.29, (4), pp. 624-633.

Broadbent, J., Gill. J. and Laughlin, R. (2003) The Private Finance Initiative in the UK: Contracting in the Context of Infrastructure Investment and Control. *International Public Management Journal*.

Brown, J. (2000) Critical Reasoning, Understanding and Self-Knowledge - *Philosophy and Phenomenological Research,* Vol. 61, No. 3 pp. 659-676.

Bryant, L. (2014) Structured Questionnaires. History Learning. UK.

Bryman A. (1992) Mixing methods: Qualitative and quantitative research – further reflections on their integration, Pp. 57 – 78.

Bryman A. (1994) Developments in qualitative data analysis: an introduction - Analyzing qualitative data. Pp. 1-17, Routledge: London & New York.

Bryman A. (2001) The nature of qualitative research - Social research methods, Pp. 365-399.

BSI (2000) British Standard Institution -Project Management – Part 3: Guide to the management of business related to project risk (BS6079-3:2000). Technical Committee MS/2.Brown.

BSI (2010) Banque Saudi Fransi. Saudi Arabia: Sector Analysis. Annual report.

Burgess, R, G. (1984) An Introduction to Field Research, London, Unwin Hyman.

Burgess, R. G, (1985) Issues In Education Research – Qualitative Methods, Lewes, Falmer Press.

Burke, R. (2003) Project Management, Planning and Control Techniques, Fourth Edition, John Wiley & Sons, Publication, West Sussex, England.

Burns, R (2000) Introduction to Research Methods, London, Sage

Buros, O.K. (2000) The ABCs of Desalting. 2nd Edition, International Desalination association (IDA): USA.

Calvert, S (1995) Managing stakeholders: the commercial project manager. New York: McGraw-Hill.

Canadian Standards Association (1997) Risk Management: Guideline for Decision-Makers (CAN/CSA-Q850-97). Canadian Standards Association. Rexdale, Ontario.

Carroll, Archie B. and Buchholtz, Ann K. (2006) Business & Society: Ethics & Stakeholder Management. Thompson, (6th Edition).

Charmaz, K (2000) Grounded Theory – Objectivist and Constructivist Methods. Thousand Oaks, CA: Sage.

Charmaz, K. (2006) Constructing grounded theory. London: Sage.

Chen, P.Y. and Krauss, A.D. (2004) Reliability. In M.S. Lewis-beck, A. Bryman, & T.F, Liao (Eds). The SAGE Encyclopedia of Social Science Research Methods. Pp. 952-956. Thousand Oaks. CA: SAGE.

Cheng, C. and Wang, Z. (2009) Public Private Partnership in China: Making Progress in a Weak Governments Environment. Briefing Series. Issue 56.The University of Nottingham.

Chenitz, W.C., and Swanson, M. (1986) From Practice to Grounded Theory: Qualitative Research in Nursing. Menlo Park: Addison-Wesley Publishing Company.

Cheung E. And Chan A P C (2011) Risk factors of Public Private Partnership project in China; comparison between the water, power and transport sectors; journal of urban planning development, V.137 (4). Pp. 409-415.

Cheung, E. & Chan, A. (2011) Evaluation Model for Assessing the Suitability of Public-Private Partnership Projects. *Journal of management in engineering*.

Chew, M.Y.L and Tan, S.S (2004) A multivariate approach to maintenance prediction of wet areas. *Construction Management and Economics*. V. 22. Pp. 395-407

Chin, P. C. (2006) Risk Management Strategy for Infrastructure PPP. Visiting Scholar at CRGP, Stanford.

Chin, T. & Bosher, C. (2005) Risk Sharing in various PPP arrangement for the provision of water and wastewater services.

Chinyio, E & Gameson, R (2009) Private finance initiative in use - Policy, finance and management for public-private partnerships, Wiley-Blackwell, Chichester, UK, pp.3-23.

Chinyio, E and Fergusson, A. (2003) A construction perspective on risk management in public –private partnership. School of the Built and Natural Environment. Glasgow Caledonian University, Blackwell Science.

Chinyio, E and Olomolaiye, P. (2010) Introducing Stakeholder Management, In: Ezekiel Chinyio and Paul Olomolaiye (eds) Stakeholder Management in Construction, Wiley-Blackwell, pp.1-12.

Chiu, P., C. (2006) Risk Management Strategy for Infrastructure Public Private Partnership Projects.

Chu, J. (1999) The BOOT approach to energy infrastructure management: a means to optimise the return from facilities. *The Journal of Facilities.* V. 17 (12) pp. 492-498.

Chuan, C. and Messner, J. (2003) Comparative Analysis of Chinese BOT Projects in Water Supply. *The Journal of Construction Management and Economy.*

Chuan, C. and Messner, J. (2005) An Investigation of Chines BOT projects in water supply: a comparative perspective. *The Journal of Construction Management and Economy*. V.23 (9). Pp. 913-925.

Clarke, A. (2009) From Grounded Theory to Situational Analysis. What's news? Why? How?, in J.M Morse, P.N. Stern, J. Corbin, B. Bowers, K. Charmaz and A.E. Clarke, Developing Grounded Theory: The Second Generation, Walnut Creek, CA: West Coast press, pp 194-234.

Cleland, D.I. (1986) Project Stakeholder Management. Project Management Journal. V.17 (4). Pp. 36-45.

Cooper, D. F. and Chapman, C. B. (1987) Risk analysis for large projects. Chichester, UK: J Wiley.

Cooper, D. F., MacDonald, D. H. and Chapman, C. B. (1985) Risk analysis of a construction cost estimate. *International Journal of Project Management*. V. 3(3), Pp. 141–149.

Corbin, J. (1986) Qualitative data analysis for grounded theory. In W.E. Chenitz W.C and Swanson, M eds., From Practice To Grounded Theory: Qualitative Research in Nursing. California: Addison-Wesley Publishing Company.

Corbin, J. and Strauss, A., (1998) Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory. Thousand Oaks: Sage.

Corbin, J., & Strauss, A. (1990) Grounded theory research: Procedures, canons, and evaluative criteria. Qualitative Sociology, 13(1), Pp. 3-21.

Corbin, J., and Strauss, A. (2008) Basics of qualitative research (3rd ed.). Los Angeles, CA: Sage.

Creswell, J. W. (1994) Research Design: Qualitative and Quantitative Approaches. Thousand Oaks, CA: Sage Publications

Creswell, J.W (2003) Research design: Qualitative, Quantitative and Mixed methods Approach. 2nd Edition, sage publication, Thousand Oaks London.

Creswell, J.W. (1998) Qualitative Inquiry and Research Design: Choosing among five Traditions. Thousand Oaks, CA: Sage.

Dalgleish, F. and Cooper, B. (2005) Risk management: developing a framework for a water authority. Management of Environmental Quality: An International Journal Vol. 16 No. 3, Pp. 235-249.

Dallas, (2006) Value and Risk Management: A Guide to Best Practice.

Darwish, M.A. (2001) On Electric Power and Desalted Water Production in Kuwait. *Desalination Journal*. V.138 (3), pp. 183-190.

Delamont, S (1992) Fieldwork in Educational Settings: Methods, Pitfalls and Perspectives, London, Falmer

Denzin, N.K and Lincoln, Y.S. (1994) Handbook of Qualitative Research. Thousand Oaks, CA: Sage.

Denzin, N.K., and Lincoln, Y.S (1998) The Landscape of Qualitative Research, (3rd Edit), Sage Publications.

Dey P. (1999) Process re-engineering for Effective implementation of Projects. International Journal of Project Management. V. 17(3). Pp. 147-159.

Dey, P. and Ogunlana, S.O. (2004) Selection and application of risk management tools and techniques for build-operate-transfer projects. Industrial Management & Data Systems, Vol. 104, No, 4, Pp. 334-346.

Dey, P., Tabucanon M.T. and Ogunlana S.O. (1994) Planning for project control Through risk analysis: The case of a pipeline project in India. International Journal of Project Management. V. 12 (1). Pp. 23-33.

Djebarni, R. (1996) The impact of stress in site management effectiveness. *Construction Management and Economics.* 14 (4): Pp. 281-293.

Durkheim, E. (1895) The Rules of Sociological Method. 8th edition, trans. Sarah A. Solovay and John M. Mueller, ed. George E. G. Catlin (1938, 1964 edition), pp. 45.

Eckart W. (2013) Oil for Food - The Global Food Crisis and the Middle East.

Edward, H., Sven O., and Zalta (2014) Risk. The Stanford Encyclopaedia of Philosophy.

Egeland, B. (2013) Project Management Tips – Guidance for Real Life Situations

EIA (2007) Energy Information Agency: Annual Energy Outlook with Projection to 2030. http://www.eia.gov/oiaf/archive/aeo07/index.html

Eisenhardt, K. M. and Graebner, M. E. (2007) Theory Building from Cases:

Opportunities and Challenges. Academy of Management Review. V. 50(1). Pp. 25-32.

Ejjeh, G. and Awerbuch, L. (2007) Desalination and Water Reuse a Technology for the Future. IAEA Conference: Oarai.

El-Amm, L. (2003) Risk Management in Toll Road Concessions. MSc thesis, School of the Civil and Environment, American University of Beirut.

Evers, A. and Nowotny, (1987) About Dealing With Uncertainty - The Discovery of the Configurability of Society. Suhrkamp Frankfurt.

Fagerhaugh, S., (1986) Analysing Data for basic Social Processes. In Chenitz, W.E., and Swanson, M., (eds.,) From Practice to Grounded Theory: qualitative research in nursing. Menlo Park: Addison-Wesley Publishing Company.

Falqi, I. (2004) Delay in project completion: A comparative study on construction delay factors in SA and the UK. Unpublished MSc thesis, SBE, Heriot Watt University, UK.

Fellows, R & Liu, A (2005) Research Methods for Construction (3rd Ed.) Oxford Blackwell Science Ltd.

Fellows, R. R. and Liu, A. (2008) Research Methods for Construction. (3rd ed.). Wiley-Blackwell Science, London.

Fellows, R.F and Liu, A.M.M (1996) Towards an appreciation of cultural factors in the procurement of construction projects.

Fellows, R.F and Liu, A.M.M (1997) Research Methods for Construction. London: Blackwell Science.

Fellows, R.F and Liu, A.M.M (2003): Research Methods for Construction 2nd Edition. Blackwell Publishing, Malden.

Flanagan, R. And Norman, G. (1993) Risk Management and Construction. Blackwell Scientific Publications, London.

Fontana, A., and Frey, 1. H. (1994) Interviewing: The Art of Science. In Denzin.

Freeman, R.E. (1984) Strategic Management – A Stakeholder Approach, Boston: Pitman Publishing Inc.

Fyfe, J. (1999) Challenges and Opportunities in Transportation: BOO/BOT Projects. 1st Workshop on Economic Cooperation in Central Asia. Published by the Asian Development Bank. Philippines.

Gibson, K. (2000) The moral basis of stakeholder theory. Journal of Business Ethics, Vol. 26 No. 2, pp. 45-57.

Gidado, K.I. (1996) Project Complexity: The Focal Point of Construction Production Planning. Construction Management and Economics.

Gilham, B. (2000) The Research Interview. London: Continuum.

Gilson, R. D. (1995) Situation Awareness – special issue preface human factors.

Glaser, B. (1978) Theoretical Sensitivity- Grounded Theory. California: Sociology Press.

Glaser, B. (1992) Emergence vs. forcing: Basics of grounded theory Analysis. Mill Valley, CA: The Sociology Press.

Glaser, B. (1998) Doing grounded theory: Issues and discussions. Mill Valley, California: Sociology Press.

Glaser, B., & Strauss, A. (1967) The discovery of grounded theory: Strategies for qualitative research. New Brunswick, NJ: Aldine Transactions.

Global Water Report. (2002) Turkish officials under investigation over possible misconduct. Global Water Report, (153) 6.

Gordon, W. (1999) Goodthinking: A Guide to Qualitative Research. Henley-on-Thames: Admap

Gray, D.E (2004) Doing Research in the Real World – Social Science. SAGE Publications.

Green, J (1999) Qualitative Methods – Community Eye Health 12 (31): 46-47, London.

Grimsey, D., and. Lewis, M. K. (2002) Evaluating the risks of public private partnerships for infrastructure projects. *International journal of Project Management.* V.20, pp. 107-118.

Guba, E. (1981) Criteria for judging the trustworthiness of naturalistic inquiries. ETCJ, 19, 7S-91

Gyi, D., Gibb, A. and Haslam, R. (1999) The quality of accident and health data in the construction industry: interviews with senior managers. Construction Management and Economics Vol. 17, pp. 197 – 204

Hafner, M. (2009) Domestic Energy Demand, Supply and efficiency, including Desalination in the Kingdome of Saudi Arabia. Ministry of Economy and Planning. Preparatory study for the 9th development plan of KSA.

Hall, D. and Lobina, E. (2004) Private and Public Interests in Water and Energy. Natural Resources Forum. V. 28, pp.268-277.

Hamed, O. A.; Al-Washmi, H. A. and Al-Otaibi, H. A. (2006) The economic analysis of a power/water cogeneration plant. Energy Journal, V. 31(14), pp 2363-2373.

Hardcastle, C. and Boothroyd, K. (2003) Risks overview in Public Private Partnership. School of the Built and Natural Environment. Glasgow Caledonian University, Blackwell Science.

Harris, C. (2004) Private Risk in Public Infrastructure – A Review of the Literature. The International Bank for Reconstruction and Development. Washington D.C

Harris, C., Hodges, Schur, and Shukla (2003) Infrastructure Projects: Public Policy for the Private Sector. Note No.252. The International Bank for Reconstruction and Development. Washington D.C.

Harzing, A, and Ruysseveldt (1995) International Human Resource Management, Sage, London

Hassanein, A. A. and Afify, H. M. (2007) Risk management practices of contractors: a case study of power station projects in Egypt. *Journal of Financial Management of Property and construction.* V. 12 (3), pp. 165- 179.

Hayes, R., Perry, J. and Thompson, J. (1986) Risk Management in Engineering Construction: A Guide to Project Analysis and Risk management. Thomas Telford, London.

Heffner, C.L (2004) Research Method. AllPsych & Heffner Media Group, Inc.

Heinz, L. (2003) Hybrid Systems in Seawater Desalination – Practical Design Aspects. EDS-European conference on Desalination and the Environment- Fresh Water for All. Malta.

Hlaing, N., Singh, D., Tiong, R., and Ehrlich, M. (2008) Perceptions of Singapore construction contractors on construction risk identification. *Journal of Financial Management of Property and Construction*. Vol. 14 (2), Pp. 85-95.

Hofstede, G. (2001) Culture's Consequences, Sage Publications, Thousand Oaks, London, Delhi.

Holden, M. T., and Lynch, P. (2004) Choosing the appropriate methodology: Understanding research philosophy. The Marketing Review. V. 4(4), Pp.397-409.

Hopkins, P. (2013) Risk Management: Strategic Success. Kogan Page Ltd.

Howell, D. (2001) Political Risk Assessment: Concept, Method and Management.

Hsiao, H., H. (2000) Risk Management in BOT Project. Unpublished Thesis. Department of Civil and environmental Engineering. Massachusetts Institute of Technology.

Hut, P. (2007) PMO and Project Management Dictionary – Project Management.

IAPWG (2006) Interagency Procurement Working Group. UN Procurement Practitioners Handbook.

Ibrahim, A.D.; Price, A.D.F.; and Dainty, A.R.J. (2006) An analysis of success factors for Public Private Partnerships in infrastructure projects in Nigeria. Journal of construction Procurement. Vol.12 (1).

Institute for Public Policy Research (2000) Summary of responses to call for evidence consultation on Public Private Partnership.

Ireland, L. (2007) Project Complexity: A Brief Exposure to Difficult Situations.

Irwin, et al. (1997) Dealing with Public Risk in Private Infrastructure – World Bank Latin American and Caribbean Studies Group, Washington D.C.

Jacob, E. (1987) Quantitative Research Traditions – A Review of Education Research, V. 57, Pp.1-50.

Jafari M., Ebrahimnezhad Y., Janmohammadi H., Nazeradl K., and Nemati M. (2011) Evaluation of protein and energy quality of poultry by-product meal using poultry assays. Afr. J. Agric. Res. V. 6. Pp. 1407-1412.

Japanese Standards Association (2001) JIS Q 2001: Guidelines for development and implementation of risk management system. Japanese Standards Association, Japan.

Jergeas, G. F., Williamson, E., Skulmoski, G. J., and Thomas, J. L. (2000) Stakeholder management on construction projects. Trans. Am. Assn. Cost. Eng., 12, 1–5.

Jian, Z. (2009) Lessons from Asian Experience. PPP Workshop, Chengdu. Carec Institute.

Johnson, B. and Christensen, L. (2005) Quantitative, Qualitative & Mixed Research – University of Southern Alabama, College Education.

Johnson, B. and Christensen, L. (2010) Educational Research (4th Ed.): Quantitative, Qualitative, and Mixed Approaches, SAGE.

Johnson, J. (2002) In-depth interviewing. In J. Gubrium, & J. Holstein (Eds.), Handbook of Qualitative, Research (pp. 103-119). Thousand Oaks, CA: Sage Publications.

KACARE (2014) King Abdullah City for Atomic and Renewable Energy. Energy Sustainability for Future Generations. (accessed August 2014), http://www.kacare.gov.sa/en/?page_id=84.

Kahn R. L., Cannell C. F., (1957) The dynamics of interviewing: theory, technique, and cases; 4th Edition, Wiley publication.

Karlsen, J.T. (2002) Project stakeholder management. Engineering Management Journal, V. 14 (4), pp. 19-24.

Kavale, K.A (1983) Fragile Findings, Complex Conclusions and Meta – Analysis in Special Education, Exceptional Education Quarterly, V. 4. Pp. 97 – 106.

Ke, Y., Wang, S. and Chan, A.P.C. (2010) Risk Allocation in PPP Infrastructure Project: Comparative Study. *Journal of Infrastructure System*. 16(4), pp.343-351.

Kelly, J. (1993) Value Management in Design Construction. Published by E&FN Spain.

Kerlinger, F.N. (1973) Foundation of Behavioural Research. New York. Holt. Rinehand and Hinston.

Kerzner H., (2009) Project Management: A System Approach to Planning, Scheduling and Controlling. Ten Edition. Published by John Weiley.

Kezsbom, D S and Edward K A (2001) The New Dynamic Project Management. New York: John Wiley & Sons Inc.

Khi, V (2006) International Handbook of Public Procurement.

KKPPI (2006) Information Memorandum. Central Java. Coal- fired Power Project. National committee for the Acceleration of Infrastructure Provision, Jakarta.

KPMG (2010) Annual Report. http://www.kpmg.com/global/en/about/international-annual-review/previous/documents/kpmg-international-annual-review-2010.pdf

Lamech and Saeed (2003) What International Investors Look for When Investing in Developing Countries, Energy and Mining Sector Board Discussion.

Levy, S.M. (1996) Build Operate Transfer. Wiley, New York.

Li B., Akintoye, A. Edwards, P.J., and Hardcastle, C. (2005) Perception of positive and negative factors influencing the attractiveness of PPP/PFI procurement for construction projects in the UK, Engineering Construction Architectural Management, Vol.12(2).

Li, B., and Akintoye, A. (2003) An overview of public –private partnership. In: Akintoye Akintola, Beck Matthias, Hardcastle Cliff, editors, Public-Private partnerships:

managing risks and opportunities. School of the Built and Natural Environment. Glasgow Caledonian University, Blackwell Science.

Likhang, R. (2009) Embedding Risk Management In Organisational Processes - Paper for CIS Corporate Governance Conference.

Lincoln, Y. S and Guba, G. E (1985) Naturalistic Inquiry, Beverly Hills CA: Sage.

Longman (2012) *Dictionary of Contemporary English*. 5th Edition. England: Pearson Education.

Loosemore, M. (1998) The Methodological Challenges Posed by Confrontational Nature of Construction Industry – Engineering, Construction and Architectural Management 5(3). Pp. 285-293.

Manen, V. M. (1977) Linking ways of knowing with ways of being practical. Curriculum Inquiry, Vol 6.

Marafiq (2011& 2009) IWPP Project. Marafiq Company- IWPP promotor (Power & water utility company). Available at http://www.marafiq.com.sa/e_projects.htm (Accessed on 2009 and 2nd Feb, 2011).

Markowitz, H. M. (1991) Foundations of Portfolio Theory. The Journal of Finance, V. 46. Pp. 469–477.

Marshall, C. and Rossman, G. (1999) Designing Qualitative Research. London: Sage.

MASON, J. Qualitative Researching. London: Sage.

Maxwell J.A (2010) Using Numbers in Qualitative Research – Qualitative Inquiry. Pp. 475-482.

Maykut, P., & Morehouse, R. (1994) Beginning Qualitative Research: A Philosophic and Practical Guide. London: The Falmer Press.

McGregor, S.L.T., & Murnane, J. A. (2010) Paradigm, methodology and method: Intellectual integrity in consumer scholarship. International Journal of Consumer Studies, V. 34 (4), Pp. 419-427. Posted with Permission from Wiley Blackwell.

McLeod, L. (1998) Doing Counselling Research. London: Sage.

McMenamin, I. (2006) Process and text: Teaching students to review the literature. PS: Political Science and Politics, V. 39(1), pp. 133–135.

McNabb, D. E. (2008) Research methods in public administration and nonprofit management: quantitative and qualitative approaches 2nd ED. M.E. Sharpe, Inc.

Merna, A and Smith N. (1994) Projects Procured by Private finance concession contracts. Project Management Group. UMIST publication Manchester.

Merna, A. and Smith, N. (1999) Privately Financed Infrastructure in the 21st Century.

Miles, M. and Huberman, M (1984) Qualitative Data Analysis: A Source Book for New Methods. Thousand Oaks, CA: Sage Publications.

Miles, M and Huberman, M (1994) Qualitative Data Analysis. 2nd Edition. Thousand Oaks, CA: Sage Publications.

Miller G. And Dingwall R. (1997) Context and Methods in Qualitative Research, Sage Publications Ltd.

Miller W.L and Crabtree (1998) Doing qualitative research. Thousand Oaks, CA: Sage

Mills, A. (2001) A systematic approach to risk management for construction. *The Journal of Structural Survey*. V.19 (5), pp. 245-252 .

Mochal, T. (2003) Poor planning is project management mistake number one - Leadership

Mohamed, K. A. (2005) Environmental Impact of Desalination Plants on the Environment. *WSTA Seventh Gulf Water Conference: Water in the GCC- Towards an Integrated Management.* V.11. Pp. 891-902.

Moloney, K. (2006) Rethinking Public Relations: PR Propaganda and Democracy (2nd edn.). London: Routledge.

Morgan, M.G. (1990) Choosing and Managing Technology-Induced Risks, in: T.S. Glickman and M. Gough (eds) Readings in Risk, pp. 5–15, Washington: Resources for the Future.

Nakshbendi, G. (2005) Public- Private Partnership: trends and Experiences GCC Perspective and Pragmatic Approach. *WSTA Seventh Gulf Water Conference: Water in the GCC- Towards an Integrated Management*. V.1. pp. 69- 80.

Naoum, S. (2003) An Overview into the Concept of Partnering. International Journal of Project Management, 21 (1), 71-76

Newcombe, R., (2003) From client to project stakeholders: a stakeholder mapping approach. Construction Management and Economics. V. 22 (9/10). Pp. 762–784.

Ng, B. (2000) Privatisation of ethnic wealth redistribution in Malaysia: experiences and lessons for developing countries, L. Montanheiro, M. Linehan (Eds.), Public and

Private Sector Partnerships: the Enabling Mix, Sheffield Hallam University, Sheffield. pp. 461–467

Ofori, G. (2007) Construction in Developing Countries Construction Management and Economics 25, 1-6.

Ogunlana, S.O., (1997) Build-operate-transfer procurement traps: examples from transportation projects in Thailand. Proceedings CIB W-92 Procurement Symposium, Procurement- The Key to Innovation, University of Montreal, Montreal, pp.585-594.

Olander, S. (2006) External stakeholder analysis in construction project management. Doctoral thesis, Lund: Lund University, Department of Construction Management.

Olander, S. and Landin, A. (2005) Evaluation of Stakeholder influence in the implementation of construction projects, International Journal of Project Management, V. 23. Pp. 321-328.

Oppenheim, A.N (1991) Questionnaire Design, Interview and Attitude Measurement. London, Continuum International Publishing Group.

Orlikowski, W.J. & Baroudi, J.J. (1991) Studying Information Technology in Organizations: Research Approaches and Assumptions. Information Systems Research V.2. Pp. 1-28.

Oyegoke, A. S. (2006) Construction industry overview in the UK, US, Japan and Finland: comparative analysis, Journal of Construction Research. V. 7(1/2). Pp.13–31

Ozorhon, B., Arditi, D., Dikmen, I. and Birgonul, M. T. (2007) Economics for the Modern Built Environment. Edited by Les Ruddock.

Patton, M. Q. (1990) Qualitative Evaluation and Research Methods (2nd ed.). Newbury Park, CA: Sage.

Patton, M. Q. (2002) *Qualitative Research & Evaluation Methods* (3rd ed.). Thousand Oaks, California: Sage Publications, Inc.

Payne, G. and Payne, J. (2004) Key Concepts in Social Research: Questionnaires. SAGE Publications, Ltd City: London

Perry, J. G. and Hayes, R. W. (1985) Risk and its management in construction projects. Proceedings of the Institute of Civil Engineering.

Pheng, L.S. and Chuan Q. T. (2006) Environmental factors and work performance of project managers in the construction industry International J Project Manager. V. 24 (1). Pp. 4–37.

Pidd, M. (2003) Tools for Thinking: Modelling in Management Science (2nd Edition), John Wiley & Sons Inc.

PMBOK (2004) A guide to the Project Management Body of Knowledge, Third Edition, Project Management Institute, Four Campus Boulevard, Newtown Square.

PMBOK (2008) A guide to the Project Management Body of Knowledge, Fourth Edition, Project Management Institute, Four Campus Boulevard, Newtown Square.

PPI (2011) World Bank Private Participation in Infrastructure (PPI) Database. Available at http://ppi.worldbank.org/explore/ppi_exploreSector.aspx?sectorID=4 Accessed on 2nd Feb, 2011.

Prasad, N. (2007) *Why is regulation insufficient? Social Policies and Private Sector Participation in Water supply*. UNRISD.

Preece, R. (1994) Starting Research: An Introduction to Academic Research and Dissertation Writing: London: Continuum. Pp. 40-45

Pritchett L, (2001) Where has all the education gone? – The World Bank Economic Review.

Punch, K.F (1998) Introduction to Social Research – Quantitative and Qualitative Approaches. London Sage.

Punch, K.F (2000) Developing Effective Research proposals. CA: Sage.

QBE International (2012) Risk Management in the Tendering Process.

Queensland Treasury (2011) A Guide to Risk Management, The State of Queensland, Financial Management Branch. A Creative Commons Attribution 3.0 Australia licence.

Raftery, J. (1994) Risk Analysis in Project Management, E & FN Spoon, London.

RAMP (2005) Risk Analysis and Management for Projects. RAMP: a strategic framework. Institution of Civil Engineers, Faculty of Actuaries, Institute of Actuaries, UK.

Raz, T. and Michael, E. (2001) Use and benefits of tools for project risk management – International Journal of Project Management, V. 19 (1).

Reid, A.J. (1996) What we want: qualitative and quantitative enquiries are not incompatible. Canadian Family Physician, Vol. 42, pp. 387-9

Renn, O. (2011) Three decades of risk research: Accomplishments and new Challenges

Renn, O., Burns, W., Kasperson, R.E., Kasperson, J.X. and Slovic, P. (1992) The social amplication of risk: theoretical foundations and empirical application, Social Issues (Special Issue: Public Responses to Environmental Hazards), 48(4), 137–60.

Rouse, M (2013) Essential Guide, Project Planning. Tech Target.

Rouse, M (2015) Project Planning: Essential Guide – Project Prioritisation & Portfolio Management Guide for CIOs.

Royal Society of Canada (2001) Report of an Expert Panel to Review the Socio- Economic Models and Related Components Supporting the Development of Canada-wide Standards for Particulate Matter and Ozone.

Rubin, H. and Rubin, I. (1995) *Qualitative Interviewing: The Art of Hearing Data*. London: Sage Publications, Inc.

Sale, J.E.M, Lohfeld, L.M and Brazil, L (2002) Revisiting the Quantitative-Qualitative debate. Implications for Mixed Use Methods Research. Quality & Quantity, pp 36, 43-53.

Sapte, D.W, (2000) International Projects Group – A guide to Project Finance. Project Risk Analysis & Management (PRAM) Guide 2nd Edition, APM Publishing AS/NZ 4360.

Saunders, M., Lewis, P. and Thornhill, A. (2003) Research Methods for Business Students, Prentice Hall.

Schaffer, M. B. (2007) Water and energy for the Middle East: currency for peace. The Journal of foresight. V. 9 (1). Pp. 50-58.

Scott, W., R. (2001) Institution and Organization. Sage: Thousand Oaks, CA.

SEC (2012) Saudi Electricity Company. [Online] Available at: http://www.sec.com.sa [Accessed Nov, 2012].

Seidman, I.E. (1991) Interviewing as Qualitative Research: A guide for researchers in Education. New York: Teachers College Press.

Sekaran, U. (1992) Instructors Manual to Accompany Research Methods for Managers - John Wiley & Sons, Incorporated

Shaoul, J. (1997) The power of accounting: reflecting on water privatization?. Accounting, Auditing & Accountability Journal. V. 10(3). Pp. 382- 405.

Shapiro, M. (1993) The Globalisation of Law, The Journal of Global Legal Studies. V.1.

Shortreed, J., Hicks, J. and Craig, L. (2003) Basic Frameworks for Risk Management report. The Ontario Ministry of the Environment. Network for Environmental Risk Assessment and Management.

Silk, M. A. and Black, S. (2000) Financing options for PRC Water Projects. Journal of China Business Review. V. 27 (4). Pp. 28- 32.

Silverman, D. (1993) Interpreting Qualitative Data: Methods for Analysing Talk, Text and Interaction, London: Sage

Silverman, D. (2001) interpreting qualitative data: Methods for analyzing talk, text and interactions. 2ed Edition. London: SAGE Publication

Sinclair, M., and Rizak, S. (2002) Drinking Water Quality Management: The Australian Framework. Paper presented at the NERAM Conference Drinking Water Safety: A Total Quality Management Approach. September 23-25, Ottawa, ON.

Smith, E, M, Thorpe, R and Jackson, P.R (1991) Management Research, 1st edition – Sage Publications Ltd.

Smith, J. and Love, P.E. (2004) Stakeholder Management During Project Inception: Strategic Needs Analysis. ASCE Journal of Architectural Engineering, V.10 (1) pp. 22-33.

Smith, J.K (1997) Quantitative Vs Qualitative Research – Sage Handbook of Mixed Methods in Social & behavioral Research.

Smith, N., Merna, T. and Jobling, P. (2006) Managing Risk in Construction Projects. 2nd edition. Blackwell Publishing.

Sommariva, C.; Awerbuch, L.; hogg, H and Callister, K. (2002) Matching power and desalination by combining thermal and membrane process: the alternative to improve flexibility and performance. Presented at IDA World Congress in Bahrain.

Spackman, M. (2002) Public-private partnerships: Lessons from the British approach, Economic Systems, Vol. 26, Pp. 283-301.

Speziale, H., and Carpenter, D. (2007) Qualitative research in nursing. Philadelphia, PA: Lippincott Williams & Wilkins.

Standards Australia/Standards New Zealand, (1999) Risk Management. Australian/ New Zealand Standard. AS/NZS 4360:1999.

Stem, C., Margoluis, R., Salafsky, N., and Brown, M. (2005) Conservation Biology: Monitoring and Evaluation in Conservation: a Review of Trends and Approaches.

Sterman, J.D. (1992) System dynamics modeling for project management, System Dynamics Group, MIT Sloan School of Management, Cambridge, MA.

Strauss, A and Corbin, J (1990) Basic of Qualitative Research – Grounded Theory Procedures and Techniques. Newbury Park, CA: Sage

Strauss, A. and Corbin, J. (1998) Basic of Qualitative Research – Technique and procedure for Developing Grounded Theory.

Sutterfield, J.S., Friday-Stroud, S.S. and Shivers-Blackwell, S.L (2006) A case study of project and stakeholder management failure: Lessons learned. Project Management Journal. V. 37(5), Pp. 26-35.

Swanson, J. M. (1986) Analysing data for categories and description. In W. C. Chenitz, & J. M. Swanson (Eds.), From Practice to Grounded Theory: Qualitative Research in Nursing (pp. 121–132). Menlo Park, CA: Addison-Wesley.

SWCC (2011; 2013; 2015) Saline Water Conversion Corporation. [Online] Available at: http://www.swcc.gov.sa/ [Accessed 2nd Feb, 2011; 2013; 2015].

SWPF (2009) Saudi Water and Power Forum. Jeddah. Available at: http://www.alriyadh.com/2009/10/12/article465872.html Accessed in 2009 and on 2nd Feb, 2011.

Tah, J. & Carr, V. (2000) Information modelling for a construction project risk management system. *Engineering, Construction and Architectural Management*. 7 (2), pp. 107-119.

Tang, W., Qiang, M.; Duffield, C.; Young, D.M; and Lu, Y. (2007) Risk Management in the Chinese Construction Industry. *Journal of Construction Engineering and Management*. V.133 (12), pp.944-955.

Tesch, R. (1990) Qualitative Research – Analysis Types and Software Tools. Basingstoke: Falmer.

The National Commercial Bank (2011) Annual Report - https://www.alahli.com/en-us/about-us/Documents/NCB-AR-2011-en.pdf

Thomas, A., Kaldindi, S., and Ganesh, L. (2006) Modelling and assessment of critical risks in BOT road projects. Construction Management and Economics. V. 24, 407–424

Thomson, S. B. (2011). Sample Size and Grounded Theory. JOAAG, Vol. 5. No. 1

Trochim, W.M.K, (2006). Research Methods Knowledge Base.

Uher, T. E. and Loosemore, M. (2004) Essentials of construction project management. Sidney: University of New South Wales Press. 408.

United Nations (2015) United Nations Report. Water Shortfall in 15 Years: Market Watch, San Francisco.

Van, M. (1977) Linking ways of knowing with ways of being practical. Curriculum Inquiry, Vol 6.

Venkatraman, N. and Prescott, J. (1990) Environment-strategy coalignment - An empirical test of its performance implications – Strategic Management Journal Volume 11.

Voelker, C., Permana, A., Tillmann, S. and Tiong, R. (2008) Political Risk Perception in Indonesian Power Project. The Journal of Financial Management of Property and Construction. V. 13 (1). Pp. 18-34.

VTU Energy (2009) Combined Power and Water Plants- From Concept to Production. VTU Energy supports IWPP projects from Pre-RFQ to Commercial Operation. [Online] Available at: www.vtu.com [Accessed 13th March, 2009].

Walker, L.O, and Avant, K.C. (2005) Strategies for theory construction in nursing. 4. Pearson Prentice Hall; Upper Saddle River, NJ.

Wang, S., Dulaimi, M. and Aguria, M. (2004) Risk management framework for construction projects in developing countries. *Construction Management and Economics*. 22, 237–252.

Weber, R., Aha, D. W. and Fernandez, R.M (2001) Intelligent Lessons Learned Systems- Expert Systems with Applications, V. 20, (1), Pp17-34.

WEC (2011) *Water and Electricity Company*. [Online] Available at: http://www.wec.com.sa/items.aspx?catId=17 [Accessed 2nd Feb, 2011].

Weiss, J.W. (2006) Business Ethics- A Stakeholder and Issues Management Approach (4th edn.). Mason: Thomson Higher Education

Wibowo, A. and Mohamed, S. (2008) Perceived Risk Allocation in Public-Private-Partnered Water Supply Projects in Indonesia. *Advancing and Integrating Construction Education, Research and Practice*.

Wideman, R.M. (1986) Risk management. Project Management Journal, Vol. 17 No.4, pp.20-26.

Winch, G. and Bonke, S. (2002) Project stakeholder mapping: Analysing the interests of project stakeholders. In: Project Management Institute (PMI): The Frontiers of Project Management Research. Pennsylvania: PMI (Chapter 23), pp. 385–403.

Woertz, E. (2013) Oil for Food – The Global Food Crisis & Middle East. Oxford University Press.

Wolfs, M. and Woodroffe, S. (2002) Structuring and financing international BOO/BOT desalination projects. Presented at European Conference on Desalination and the Environment: Water shortage.

WRI (2011) *World Resources Institute*. [Online] Available at: http://projects.wri.org/sd-pams-database/saudi-arabia/integrated-independent-water-and-power-projects-iwpps. [Accessed 2nd Feb, 2011].

Xenidis, Y. and Angelides, D. (2005) The financial risks in Build Operate Transfer projects. Construction Management and Economics, 23, pp. 431-441.

Yang, J.B.; Yang, C. C. and Kao, C, K. (2010) Evaluating schedule delay causes for private participating public construction works under the Build-Operate-Transfer model. International Journal of Project Management. V. 28. Pp. 569–579.

Yin, R.K. (1994) Discovering the future of the case study method in evaluation research. Evaluation Practice, 15, 283-290.

Yin, R.K. (2003) Case Study Research – Design and Methods. Thousand Oaks, California: Sage.

Zhan, Z., Kobsiriphat, J., Wilson, R., Pillai, M., Kim, I. and Barnett S. A. (2009) Syngas Production by Electrolysis of CO2 /H2O: The Basis for a Renewable Energy Cycle, Energy & Fuels

Zhang, X. (2005) Critical Success factors (CSFs) for Public-Private Partnerships in Infrastructure Development. Journal of Construction Engineering and Management. Vol.131 (1) 3-14.

Zhao, Z. Y., Zuo, J., Zillante, G. and Wang, X. W. (2009) Critical Success Factors for BOT Electric Power Projects in China: Thermal Power versus Wind Power. The Journal of Elsevier. V. 35 (1). Pp. 1283- 1291.

Zou, P.X.W., Zhang, G. and Wang, J.Y. (2007) Understanding the key risks in construction projects in China, International Journal of Project Management, V. 25 (6), pp. 601-614.

Zou, P.X.W.; Wang, S.; and Fang, D. (2008) A life-cycle risk management framework for PPP infrastructure projects. Journal of Financial Management of Property and Construction. Vol. 13 (2), pp.123-142.

Appendix A

Interview Guide

INTRODUCTION

Greeting:

I want to thank you for taking the time to meet with me today. My name is Yousef Alsulaiman and I would like to talk to you about your experiences participating in the ***Water and Power projects.*** Specifically, I am doing my PhD study about devising an organized procedure for effective management of risks in IWPP projects. The interview should take around 45 min. I will be recording the session because I don't want to miss any of your comments. Although I will be taking some notes during the session, I can't possibly write fast enough to get it all down. All responses will be kept confidential. This means that your interview responses will only be shared with research team members and I will ensure that any information we include in my study does not identify you as the respondent. Remember, you don't have to talk about anything you don't want to and you may end the interview at any time.

- Are there any questions about what I have just explained?

QUESTIONS

- What are the types of projects commonly carried out by the organisation?
- What procurement methods are commonly used for the delivery of your projects?
- What are the typical problems encountered in those projects & severity of the problems.
- What where the eventual outcomes of the problems?
- Is risk assessment carried out at the beginning of the projects?
- What does the organisation consider as failures after project completion?
- Does the organisation understand and practice risk management procedures?

- What do they think about the current practice of risk management in the organisation?.
- What's the current status of the risk management processes in WPP/IWPP projects? How are these being managed?
- Through your experience involving WPP/ IWPP projects, what practical risk factors would you consider to be important?
- What are the main sources of WPP/ IWPP project failures in terms of risk?
- What are the main implementation barriers of risk management process in WPP/ IWPP projects?
- Do you use the risk management framework throughout the project lifecycle?
- How do you identify and manage the inherent risk factors associated with WPP/ IWPP projects?
- After a project cycle, does the organisation undertake a lesson learnt workshop, to understand what went wrong and what lessons to put forward for the future project reference?
- Can developments of risk management framework specified for IWPP projects contribute to enhance the success of future projects in terms of time, cost and quality?
- Does the organisation have a risk manager\officer in place?
- What recommendations do you have for future efforts towards the improvements?

Closing

We have reached the end of our interview, is there anything you would like to add?
I'll be analyzing the information you and others gave me and submitting a report to the project team in three months. I'll be happy to send you a copy to review at that time, if you are interested. ***''Thank you for your time. Then, switch off the recorder.''***

Appendix B

Interviewees' details

Round	Interview NO.	Organization Role	Organization Name	Participant Position	Experience	Interview duration
1	Int.1	Government Official	SWCC	PM	10 Years	49 Min
	Int.2			Follow up and Planning Engineer	11 Years	55.4 Min
	Int.3	Consultant	Fichtiner company	Site Engineer	9 Years	39.3 Min
	Int.4	Project Promoters (SPV)	SWEC	PM	14 Years	65.5 Min
	Int.5		SqWEC	Executive Engineer	9 Years	53 Min
	Int.6	Contractor	Doosan Heavy Industries	Assistant Manager	16 Years	44 Min
	Int.7	Facilities Provider	Marafiq company	Operational Manager	11 Years	41 Min
	Total					347.2 Min

Round	Interview NO.	Organization Role	Organization Name	Participant Position	Experience	Interview duration
2	Int.8	Government Official	SWCC	Engineering Dep. Manager	22 Years	76.8 Min
	Int.9			PM	17 Years	61 Min
	Int.10	Consultant	ILF company	PM	18 Years	47 Min
	Int.11	Project Promoters (SPV)	SWEC	PM	18 Years	50.3 Min
	Int.12		SqWEC	PM	9 Years	59 Min
	Int.13	Contractor	Mitsubishi Heavy Industries	Site Manager	16 Years	45.8 Min
	Int.14	Facilities Provider	SqWEC	Operational Manager	20 Years	71 Min
	Total					410.9 Min

Round	Interview NO.	Organization Role	Organization Name	Participant Position	Experience	Interview duration
3	Int.15	Government Official	SWCC	Director of Project Execution Dep.	27 Years	91.6 Min
	Int.16			Chairman of supervision Committee	25 Years	81.2 Min
	Int.17	Consultant	Fichtner company	PM	14 Years	67 Min
	Int.18	Project Promoters (SPV)	SWEC	Director of Projects Dep.	22 Years	71.4 Min
	Int.19		SqWEC	PM	16 Years	84 Min
	Int.20	Contractor	Doosan Heavy Industries	PM	19 Years	73 Min
	Int.21	Facilities Provider	Shuaiba Water and Electricity Co.	Operational Manager	18 Years	63 Min
	Total					531.2 Min

Summary of interviewees' details in the three rounds

Round	Interview NO.	Organisation Role	Organisation Name	Participant Position	Experience	Interview duration.
1	Int. 1	Government Official	Saline Water Conversion Corporation (SWCC)	Project Manager	10 Years	49 min
	Int. 2			Follow up & Planning Engineer	11 Years	55.4 min
	Int. 3	Consultant	Fichtner company	Site Engineer	9 Years	39.3 min
	Int. 4	Project Promoter (SPV)	Shuaiba Water and Electricity Company (SWEC)	Project Manager	14 Years	65.5 min
	Int. 5		Shuqaiq water and Electricity Company (SqWEC)	Executive Engineer	9 Years	53 min
	Int. 6	Contractor	Doosan Heavy Industries	Assistant Manager	16 Years	44 min
	Int. 7	Facilities Provider	Marafiq Company	Operational Manager	11 Years	41 min
			Total			347.2 Min
2	Int. 1	Government Official	SWCC	Engineering Dept. Manager	22 Years	76.8 min
	Int. 2			Project Manager	17 Years	61 min
	Int. 3	Consultant	ILF company	Project Manager	13 Years	47 min
	Int. 4	Project Promoter (SPV)	SWEC	Project Manager	13 Years	50.3 min
	Int. 5		SqWEC	Project Manager	9 Years	59 min
	Int. 6	Contractor	Mitsubishi Heavy Industries	Site Manager	16 Years	45.8 min
	Int. 7	Facilities Provider	Shuqaiq water and Electricity Company	Operational Manager	20 Years	71 min
			Total			410.9 Min
3	Int. 1	Government Official	SWCC	The Director of Project Execution Dep.	27 Years	91.6 min
	Int. 2			Chairman Supervision Committee	25 Years	81.2 min
	Int. 3	Consultant	Fichtner company	Project Manager	14 Years	67 min
	Int. 4	Project Promoter (SPV)	SWEC	The Director of Project Dep.	22 Years	71.4 min
	Int. 5		SqWEC	Project Manager	16 Years	84 min
	Int. 6	Contractor	Doosan Heavy Industries	Project Manager	19 Years	73 min
	Int. 7	Facilities Provider	Shuaiba Water and Electricity Company	Operational Manager	18 Years	63 min
			Total			531.2 Min
			21 Interviews		**Total**	**1289.3 MIN**

Appendix C

Interview permission- Request letter

Heriot-Watt University
School of the Built Environment

31. Jan. 2012
Subject: **Request for Permission and cooperation in obtaining information**

Dear Sir,

Eng. Yousef Saad Alsulaiman is a doctoral student in the School of Built Environment, Heriot-Watt University. The title of his research is ***"Developing an Effective Risk Management Framework for Independent Water and Power Plant (IWPP) in Saudi Arabia"***. The prime aim of this research is to devise an organised procedure for effective management of risks in independent water and power plant (IWPP) projects.

The research work will require extensive gathering of relevant case study data related to water and power sector projects. This will include conducting of interviews and relevant project related information. It is hoped that your support and cooperation will enable the student to collect such data so that the final output of the research provides a useful academic and practical contribution.

For such purpose, Eng. Yousef and the research supervisors would like to ask for your permission and support in obtaining information on projects developed through IWPP and traditional scheme by your department. The information will be obtained through the following stages:

1. Interviews with key personal involved in the department and its projects.
2. Gathering other relevant documents related to the project, such as project contractor, project routine, progress reports, list of parties involved in the projects, etc.

Since the sources and substances of information are essential to the success of this research, your kind support will enable him to derive maximum benefit from his research work and produce valuable contribution. Please be assured that any given information will be treated as strictly confidential and used only for academic purposes; where your name and/or your organization name will not be mentioned explicitly/directly in this study unless we have your permission. In fact, the focus will be towards collecting data, leading to results that could assist in achieving this study's aim.

To reassure you all such fieldwork is subject to ethical approval by the University Ethics Committee

The research team will be pleased to send to you a summary of the results and analysis as soon as they become available in case you wish to do so. Please do not hesitate to contact any member of the research team if you would like further clarification.

Thanking you in anticipation of your kind consideration.

Yours faithfully,

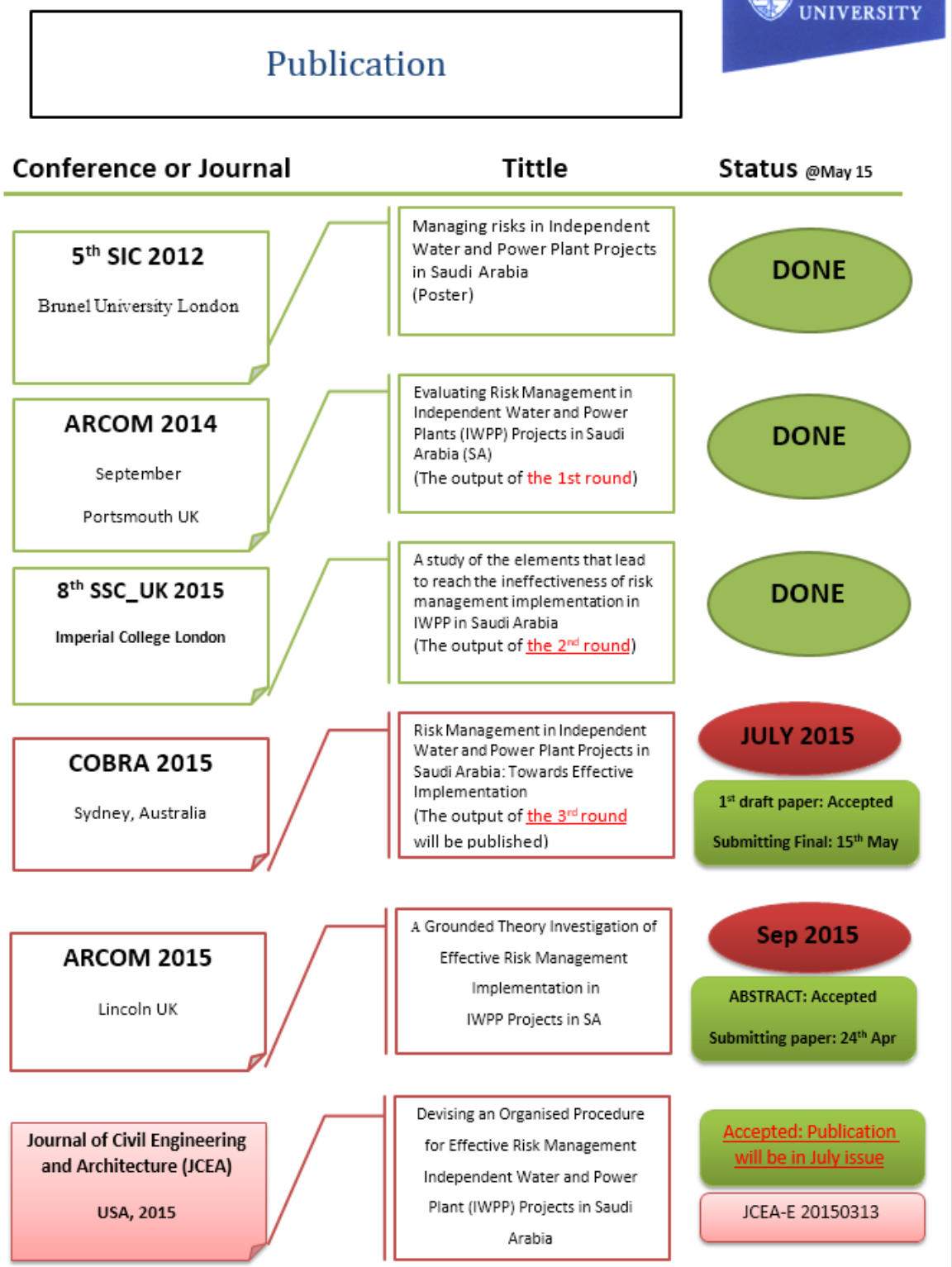
Dr.Graeme Bowles
G.Bowles@hw.ac.uk
Primary Supervisor
School of the Built Environment- HW University

Professor Stephen Ogunlana
S.O.Ogunlana@hw.ac.uk
Secondary Supervisor
School of the Built Environment- HW University

Appendix D

Publication

Publication



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